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AVIATION AND COSMONAUTICS

No 9, September 1989

Restructuring at AF Schools

90R10003A Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 1-3

[Article by Col Gen Avn A. Goryainov, deputy commander in chief of the Air Force for military educational institutions: "Air Force Higher Educational Institutions and Perestroyka"]

[Text] Air Force schools are in their third year of implementation of the CPSU Central Committee and USSR Council of Ministers decree entitled "Basic Directions of Restructuring of Higher Education and Secondary Specialized Education in This Country." A great deal has already been accomplished. The staffs at the Military Air Academy imeni Yu. A. Gagarin, the Air Force Engineering Academy imeni N. Ye. Zhukovskiy, the Kiev and Kharkov Higher Military Aviation Engineering Schools, the Balashov Higher Military Aviation School for Pilots, and the Achinsk Military Aviation Technical School are working most effectively in this area.

At a conference of leader personnel held in January of this year, the USSR Minister of Defense formulated a strategy of military educational institution activities: training of cadres capable of accomplishing the tasks of maintaining Armed Forces combat and mobilization readiness in conformity with today's requirements and with excellent quality; training and indoctrination of personnel; and strengthening of military discipline. The main criterion is preparedness for flawless performance of one's job duties.

The majority of Air Force personnel are conscientiously carrying out their military duty. They displayed fine examples of courage and a high degree of professional skill in the Republic of Afghanistan, during disaster recovery efforts at Chernobyl, during earthquake recovery activities in Armenia, and in other situations. Certain facts indicate, however, that many graduates have a poor mastery of weapons and equipment, are not prepared to lead subunits and units, and make serious mistakes in training and indoctrinating their men.

In this connection aggressive efforts are in progress to accomplish further intensification of restructuring of armed services schools. Work is being done in the following principal areas: restructuring of the military education system, providing for radical change in organization and quality of the training and indoctrination process; increasing the knowledge of tactics and the specialized knowledge of enrolled personnel; substantial improvement in the military job-related training of personnel; improvement in management and administration of military educational institutions. The end objective is to graduate highly-trained, professionally-competent officers possessing an adequate level of general knowledgeability, and particularly in the area of psychology and education science.

Effectiveness of defense organizational development can be ensured high qualitative parameters only via a new state and status of cadres. The main role in this important area is played by instructors. The instructor is the central figure at the military educational institution. The quality of instruction and indoctrination depends on his knowledge and methodological skill, ideological maturity, level of knowledgeability, and tact. He is a bearer and disseminator of truth—intellect engenders intellect, and conscience engenders conscience. More than 1,500 doctors and candidates of sciences and a large number of teacher-innovators and talented instructors are presently teaching at Air Force higher educational institutions.

Perestroyka has opened up extensive opportunities for initiative and innovation. Armed services schools are today rejecting authoritarian education science which prevailed for decades and are adopting the pedagogy of development, cooperation, and humanism. More and more instructors are conducting classes utilizing the methods V. Shatalov and M. Shchetinin. Scientific methods seminars for instructor-innovators at pilot, navigator, engineering, and technical schools were held in May (at the Kiev Higher Military Aviation Engineering School) and in June (at the Kacha Higher Military Aviation School for Pilots), for the purpose of dissemination and exchange of know-how and more aggressive adoption of progressive forms and methods into the instructional process. Problems of application of automated teaching systems (AOS), individual instruction, activation of student cognitive activity, and practical directional thrust in instruction were discussed at these seminars.

At the Kharkov Higher Military Aviation Engineering School, for example, deputy department head Candidate of Technical Sciences Docent Col L. Fadeyev is successfully applying the V. Shatalov method. He has totally abandoned the traditional form of the lecture class, where students are passive participants, replacing it with an active teaching technique, whereby during the entire class students are involved in "acquiring" knowledge under his guidance. A democratic spirit, a high degree of demandingness, an individual approach to each student, and constant willingness and readiness for dialogue characterize this instructor-innovator, teaching professional, and outstanding methods specialist.

At the Kacha Higher Military Aviation School for Pilots, a method of instruction using symbols has been developed under the direction of department head Candidate of Technical Sciences Docent Col Ye. Borodkin. As a result the pilot cadets master aircraft cockpit equipment and cockpit procedures much more rapidly, and are faster in acquiring skills in responding to in-flight emergencies.

Maj G. Ryabkov, senior instructor at the Kaliningrad Military Aviation Technical School, has achieved good results with the aid of the M. Shchetinin method. One feature of this method is the fact that the course material is presented not in small doses but in large units. Students spend several days immersed in a single subject, as it were. This cycle is repeated three times over a specified period of time. Thus the subject is studied not sequentially, by topics, but in parallel, with transition from a low level to a higher level of knowledge, from a general grasp to mastery of the smallest details. Marks are not given at instruction classes. A special point system encourages activeness on the part of the students, with points later contributing to the course grade. The results of the first two examination sessions are encouraging.

Adoption of computers into the curricular process is an important element. At the Military Air Academy imeni Yu. A. Gagarin, the Air Force Engineering Academy imeni N. Ye. Zhukovskiy, and at the Kiev, Irkutsk, and Kharkov Higher Military Aviation Engineering Schools, many instructors are skilled computer users. They include Cols V. Kobelkov, V. Belyakov, S. Miroshnichenko, Lt Col V. Luchnikov, and others. Things are not going this well everywhere, however. A serious lag in this area has been noted at such schools as the Tambov Higher Military Aviation Engineering School and at the Saratov Higher Military Aviation School for Pilots.

Changes are taking place in the nature of accountability at state examinations. The overwhelming majority of senior projects and term papers deal with practical line-unit needs. The assignment of combined senior projects practiced at the Air Force Engineering Academy imeni N. Ye. Zhukovskiy, for example, constitutes a new approach to solving the problem of further improving personnel training. The initiators of this innovation include academy commanding officer Professor Col Gen Avn V. Kremlev and faculty heads doctors of technical sciences professors Maj Gens Avn V. Pavlenko, D. Gladkov, G. Kondratenkov, and Col Yu. Kulifeyev.

Here is an example. A group senior project involving design of a modern combat aircraft system was submitted to the State Examination Board. Twenty-one students from four different faculties worked on this project. They did a brilliant job of dissertation defense. State Examination Board Chairman Hero of the Soviet Union Mar Avn G. Zimin assessed their labors as follows: "This combined senior project is distinguished by thoroughness of handling of all items. The students thoroughly researched a number of problems, possess a good mastery of the mathematics involved, and displayed excellent knowledge both of their own portion of the project and of the entire aircraft system. The experience of this type of senior project should be synthesized and extended to all military engineering schools."

Air Force schools are for the most part adequately staffed with teaching faculty. The system of training these personnel, however, requires further improvement. I believe that this should be done in advance, on the basis of a careful screening and selection process, determining students who have an aptitude for teaching and scientific work and preparing them according to a special training curriculum. After several years of service in line units, such officers should be sent to postgraduate programs to continue their studies. The field of activities of postgraduate programs should be expanded, since at the present time they are engaged in training only scientific personnel. Of course the novice instructor schools operating at every military educational institution should also perform this task more effectively. And of course the need for constant instructor self-education is obvious.

One important area of restructuring of the military education system is improving the level of student tactical and specialized knowledge. For this reason special emphasis is placed on tactics training at higher military aviation schools for pilots and navigators. Good results are produced by tactical air drills during the performance of which the main points of theory of the various disciplines are implemented in a practical manner. At the Yeysk, Kacha, and Chernigov Higher Military Aviation Schools for Pilots, for example, cadets work on mastering various types of flying, including combat flying, always against a tactical background, in conditions which have been specifically made complex. This approach helps them develop the ability rapidly to assess a situation and to make a correct decision, and it develops boldness and decisiveness.

A method has been found for improving the training of flight personnel for crew-flown aircraft. Experimental joint training of student pilots and student navigators is being conducted at the Tambov Higher Military Aviation School for Pilots and at the Chelyabinsk Higher Military Aviation School for Navigators. In the third year of school cadets from the two schools take training flights as a single crew. This gives them the opportunity to obtain practical experience in working in coordination with one another and to learn mutual understanding and mutual assistance.

Perestroyka has forced us to change our views on education. While until quite recently the principle of "education to last one's entire life" was the main element, today another principle has been placed on the agenda: "Education throughout one's entire life." The times urgently demand that the schools graduate comprehensively prepared officers. It is precisely for this reason that there are plans to introduce the teaching of ethics, aesthetics and, at a later date, the fundamentals of world culture as well.

We should say a few words about secondary-school graduates in this connection. It is gratifying that there is today increased competition for enrollment at pilot and navigator schools. More and more of the newly-enrolling cadets have already gone through primary training in DOSAAF flying clubs and aviation sports clubs. The Kiev Higher Military Aviation Engineering School, the Kharkov Higher Military Aviation Engineering School

and Higher Military Aviation School of Electronics, and aviation technical Schools are continuing to enjoy popularity.

The procedure and length of study at the Air Force Engineering Academy imeni N. Ye. Zhukovskiy have been changed effective 1989. In addition to slushateli [students who are already a commissioned officer before commencing their studies], the academy now enrolls kursanty [cadets, who become commissioned officers upon graduation], selected from among civilian youths, graduates of Suvorov schools, compulsory-service and reserve sergeants and privates. The latter will be enrolled in a six-year curriculum. In the interests of obtaining more thorough preparation, length of study for slushateli has been extended by one year.

But there is also reason for concern. The physical condition and general educational level of candidates for enrollment are worsening year by year. They include few compulsory-service sergeants and privates, and few reserve personnel. There are many reasons for this. Perhaps the main reason is that the formal status of the kursant [cadet] has not yet been determined: the individual who has already served in a line unit and who may even have served in combat has the same status as the cadet who is just beginning his military service. It is clearly time to resolve this matter. In our opinion it would be advisable to convert the former, from the moment of enrollment, to the status of extended-service personnel with the right of dormitory residence, while other new cadets should be given similar status upon completing the second year.

The activities of military educational institutions in conditions of democracy and glasnost are producing positive results: there is now greater innovativeness, efficiency and flexibility in resolving various problems. At the same time "mass-meeting democracy" is developing at certain schools, where criticism of shortcomings predominates and where there are very few constructive suggestions and, particularly, practical actions. Political agencies and the corresponding academic departments should take a hand here. The forms and methods of teaching the social sciences must be made more active and persuasive, based on the realities of life.

Particular attention should be devoted to the practical preparation of secondary-school graduates, for the quality of preparation does not fully meet requirements. We see reserve potential for accomplishing this important task in further development of training facilities and equipping them with modern training simulators and aircraft, and staffing military educational institutions with qualified instructors. A great deal depends on the activities of the latter, and therefore we must resolve without delay the problems facing instructor personnel. The instructor's labor must be encouraged with both moral and material incentive.

In spite of various difficulties, instructor personnel are constantly seeking new forms and methods of teaching flying skills. At the Chernigov Higher Military Aviation School for Pilots, for example, Cols V. Sobolev, V. Shevtsov, and N. Litvinchuk are at their own initiative successfully conducting an experiment to make student pilots more active in the course of preparing for and carrying out training flights. Instructor pilots S. Vasilyev, N. Klochko, and G. Semenov, Sr Lt O. Nurtazin, and many others have also achieved considerable success in practical training endeavors. Thousands of graduates of pilot and navigator schools learned to fly from these instructors.

Restructuring of the activities of military educational institutions is directly linked with problems of discipline, organization, and order. But these problems should be resolved not only by means of strengthening one-man command and establishing absolute observance of the requirements of general military regulations, but also by increasing democracy and glasnost and continuously improving the training and indoctrination process, for the overwhelming majority of cadets and other students, when they become enthusiastic about "acquisition" of knowledge and gain satisfaction from study, are not inclined to commit gross breaches of regulations or to deviate from procedures and flight discipline when operating aircraft on the ground and in the air.

An important role in this continues to be played by cadet subunit commanders, who as a rule are highly-qualified and disciplined officers. Appreciable changes are noted on the part of many of these: an individual approach is beginning gradually to supplant the method of administrative fiat and coercion. Among the ranks of knowledgeable and thoughtful educators and indoctrinators, we should note first and foremost Cols L. Ivanov, V. Nazarov, V. Siganov, and O. Mavrin, Lt Cols E. Nosevich and B. Papadin, Maj V. Vedeshkin, and Sr Lt F. Begal. But one still encounters commanders who conduct themselves with crudeness and arrogance. At times they simply do not want to see a cadet as a future respected officer corps colleague. It would be well to remind such individuals that if the seeds of a respectful attitude toward subordinates are planted in the hearts of cadets, future officers, these seeds will bear favorable fruit throughout their subsequent military service.

Recently sociological and psychological studies have been actively conducted at military educational institutions. This is new, complicated, but very essential work, for without knowledge of the social conditions in which military personnel live and work, without determining the motives for their noble and ignoble actions, without creating an atmosphere for innovation and initiative by each individual, it will be impossible to resolve the problem of further strengthening military discipline.

Military educational institutions are at a turning-point stage in their development. Great deeds lie ahead. Teaching faculty, flight and technical personnel are doing and will continue to do everything they can to

ensure that each year highly-qualified officer personnel join the ranks of reliable defenders of peaceful Soviet skies.

Problems of Ensuring Proficient Air Navigation

90R10003B Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 4-5

[Article, published under the heading "For a High Degree of Combat Readiness," by Military Navigator 1st Class Col V. Dudin, candidate of military sciences: "Accurate, Reliable, Safe Air Navigation"]

[Text] Hundreds of aircraft from all Air Force components are engaged in flight operations daily in the airspace above various geographic regions—from heavy aircraft with several navigators aboard to fighters, with the pilot combining all flight duties, including navigation. And each aircrew, regardless of its composition and the gear and equipment carried aboard, must have the ability to reach ground, sea, and air targets, airmobile landing zones, airborne drop zones, and destination fields accurately, reliably, while observing safety procedures, and on schedule, adhering to predetermined flight paths and routes. It is this which determines the practical aspect of air navigation as an aggregate of actions by flight personnel pertaining to flying an aircraft.

Accuracy and reliability of navigation and navigational flight safety cannot be achieved without constant, painstaking work by navigation services, aimed at achieving and maintaining an adequate level of navigation training and proficiency in Air Force units and combined units. An integral part of this effort is the search for ways to improve the accuracy performance of targeting and navigation avionics and improvement of methods of operating these systems.

A number of measures of a methods, organizational, and technical nature have been developed and implemented in Air Force units in recent years for the purpose of resolving these problems. The navigation service as well as specialist personnel of the aviation engineer service and air traffic control agencies seek reserve potential at all levels for accomplishing more thorough mastery by flight and ground personnel of modern navigational equipment and full utilization of its performance capabilities.

During training flights, during operational readiness inspections, and at training exercises pilots and navigators hone their skills in flying aircraft in a difficult navigational and tactical environment. At spring exercises this year, for example, the aircrews of the units and combined units with which officers V. Korobetskiy, B. Kondakov, and Yu. Privalov serve as navigators performed all mock combat missions in an exemplary manner, including missions assigned while airborne and subsequent retargeting.

Unfortunately there are also examples of another kind as well. Wherever navigation training of flight personnel and command and control facility officers is done in an unsystematic and lip-service manner, and where proficiency level is not checked or evaluated, deficiencies accumulate and can in the final analysis lead to undesirable consequences. For example, a series of gross errors made by Pilot 1st Class Captain E., as he was flying a supersonic high-altitude bomber/reconnaissance aircraft on a stratosphere-level bombing mission, ended in an in-flight emergency.

This pilot made two mistakes one after the other during climbout following takeoff: he failed promptly to verify gear retraction and the position of the radio channel selector, and this with a radio which had already been giving some problems. Having discovered that one of his gear wheels was still down and that he was out of communications contact with the ground, the pilot concentrated his attention on the gear and radio controls and failed to monitor the navigational aspects of the flight. As a result, after several minutes of flying above cloud cover on afterburners, he lost his bearings, although the aircraft was within range of several local radio navigation system beacons as well as within effective range of the approach facilities of nearby airfields.

Taking no steps to report his situation on any of the communications frequencies, and failing to ask either his position or bearing, the pilot decided to correct the situation on his own, at all costs. He proceeded to act contrary to the requirements of regulations applying to such a situation: he failed to squawk the transponder code indicating an in-flight problem, and he failed to follow the leader aircraft vectored to him. Even when he spotted a nearby airfield through a break in the clouds, he failed to take this opportunity to end his flight safely, although he was very low on fuel. As a result he "saved" himself, as he saw it, from a mishap-threatening situation (he failed to land at an unscheduled airfield), but in fact he was being saved from an accident actually in progress, since he was forced to eject following fuel exhaustion.

Matters pertaining to ensuring accuracy and reliability of navigation in the course of mastering a new aircraft have taken on specific features for each Air Force component and even for each specific version of fixed-wing and rotary-wing airborne equipment. This is the result of substantial changes in the character of "communication" between crewmembers and aircraft instruments and correspondingly in the required knowledge and skills in their utilization.

As we know, on aircraft of previous generations navigation equipment consisted of a number of essential devices (compass, airspeed indicator, clock, and subsequently airborne radar and Doppler navigation equipment), devices which, however, were not integrated into a navigational avionics package. Of course they were of various complexity, which was determined by the type

and function of the aircraft in question. But their principles and methods of operation were almost the same from one aircraft to another. Each instrument (directional gyro, astrocompass, radar, etc) had its own controls, calibration, adjustment, and correction knobs. Theory and practical techniques for obtaining reliable navigational information were fairly thoroughly developed.

The specialist (navigator, pilot) who mastered a greater number of such procedures, many of which were learned not only from manuals but primarily from instructor to student, as a rule achieved excellent results both in accuracy and reliability of navigation, with the prestige of a navigation professional. Combined utilization of the entire arsenal of ground and airborne devices, providing comparison and mutual cross-checking of flight navigation elements and components, formed the basis of the assured success of these "Akkuratovs" (from the name of famed polar air navigator V. Akkuratov). Not only accuracy but also reliability of navigation was achieved with this, whereby errors in individual instruments as well as operator errors in taking individual readings would be localized in advance. The situation changed considerably with the appearance of navigational avionics packages aboard modern aircraft, packages which integrated separate instruments, systems, and sensors into a single onboard digital-computer-driven unit. Today automation of the process of correcting computed aircraft position coordinates, communication between navigational avionics package, automatic control system, and weapon systems, and preliminary entry of principal waypoints into the computer do not require any active efforts on the part of the crew, reducing the majority of functions to monitoring procedures.

Unquestionably the adoption of integrated navigational systems has not only reduced the workload on aircrews, particularly in the case of single-seat aircraft, but has also substantially improved navigation accuracy and precision. One should not, however, unequivocally claim assured improvement of reliability and elimination of mistakes such as those described above. The fact is that the technical aspect of the problem of using integrated navigational packages is manifested in instances of equipment malfunction. Today these occurrences are much less frequent than airborne instrument failures in the past. But today we have difficulties of a different type.

While in the past instrument failures were in the overwhelming majority of cases of a clear-cut, unambiguous "either-or" nature (it is either working or is not), today this type of failure of an entire integrated navigation avionics package is extremely rare. Nevertheless operational malfunctions of individual circuits, components, or subsystems frequently occur. And as a rule they are of a different type—"the instrument is working, but inaccurately"—and are of a variable (intermittent) nature, with different symptoms during operation aloft and subsequently when checked on the ground. As a consequence the principal indicator of system operation—accuracy of automated computation of an aircraft's current position coordinates—in practice frequently proves to be worse than stated by specifications and performance characteristics. Crewmember capability to affect system operation during flight is extremely limited.

At the same time there has unfortunately developed a widespread simplified assessment of the altered mutual relationship within the "man-machine" ("pilot-navigational avionics package" in this case) system. You frequently hear the following today: if the aircraft has accurately tracked its preselected course, this means that the system has functioned well, while if it has deviated from course, even with an obvious equipment malfunction, the pilot is to blame. One should evidently move from such extremes to a synthesized evaluation of the functioning of the entire system.

As a consequence of limited capability to affect the accuracy of the system's operation, the pilot (navigator) is transformed from the equipment's master to an operator performing elementary actions of the "switch on - switch off" type, and frequently into merely an information consumer. In this situation it is not at all easy to fulfill demands pertaining to combined utilization of navigation equipment and systems (in the former definition), since combined utilization is maximally accomplished in the design of the system, and little remains for the human operator to do. Precisely for this reason some navigators and pilots fail to practice methods of different-variation use of the navigational avionics package and become totally dependent on its operation. This makes navigational reliability poor, that is, reliability lasts until the first equipment malfunction.

Analysis of pilot errors and in-flight mishap-threatening incidents indicates that it is possible and necessary with modern integrated navigational systems to work out and practice a sequence of actions which make it possible to increase reliability of navigation, when failures or malfunctions occur for various reasons in the operation of airborne and ground systems, including when caused by hostile weapons and jamming. Three general objectives are formulated: to obtain the ability to check the accuracy of system readings, the ability to determine system malfunctions, particularly of a non-obvious nature and, finally, the ability to ensure, in case the need arises, sufficient accuracy of flight to the specified objective and return using backup means. This is how the problem has been formulated, for example, in the large strategic formation with which Col S. Pashkov serves.

It is advisable to check integrated navigational avionics package operations separately by system heading specified at the beginning of each leg, followed by distance remaining to the next waypoint. Accuracy of heading is estimated by comparing course indicators operating on different principles, as well as with the aid of navaids located at relative bearings of zero and 180 degrees. Distance remaining and distance covered are verified by

using distance-measuring systems selected in advance and from abeam lines of position.

In order to check instrument readings, one must use a stopwatch and visual reference. Unfortunately flight personnel make use of the services of these reliable aids in a very limited way. In addition, some aviators have difficulty calculating how many kilometers their aircraft covers in a minute's time at a given speed and how many seconds it takes to travel 1 kilometer (and yet this is the basis for many mental calculations). An aircraft's position determined by short-range navigation system readings (azimuth and range) is rarely compared with its actual position relative to visual or radar reference points, because for this one must train and prepare on the ground. Aloft, however, one cannot put ruler to aeronautical chart on every type of aircraft and work station, especially the pilot's position. and many people fail to do this during training and preparation....

Aviators also neglect to estimate the correctness of their general heading on the basis of bearing to the sun, moon, and prominent stars. Of course this cannot be accomplished with a high degree of accuracy, but one certainly can detect a gross error, especially with a sudden failure of the course-and-heading component or faulty instructions from the ground. But once again only with thorough training and preparation in advance. This is extremely important in an actual combat situation (after disengaging from maneuver air-to-air combat, when breaking contact from the enemy in the area adjacent to the front), which is confirmed by the experience of the Great Patriotic War and by local conflicts.

In many instances aircrews find themselves in a difficult situation due to failure to monitor holding of the assigned altitude or flight level. Ignoring the tried and proven rule—compare the readings of altimeters operating on different principles—sometimes leads to extremely grave consequences—collision with the terrain or with manmade obstructions.

There are two ways, common to all Air Force components, to ensure accuracy, reliability, and safety of navigation. The first is regular study of statistics of gross mistakes and errors typical of the crews of a specific type of aircraft and the missions they fly. No matter how unrealistic cases of error amounting to hundreds of kilometers or even a heading error of 180 degrees may seem, one must be familiar with such cases, in order to be alert in a similar situation.

The second way is demonstration and subsequent verification on check rides to ensure that personnel have mastered proper procedures of utilizing navigational equipment and procedures to regain one's bearings. Of course the proposed scenarios must be thought out in every detail and must be approved by the command element, and there should be no possibility whatsoever of creating an actual hazard or danger during demonstration or when practicing these procedures. But without the above many of our tests of the quality of aircrew navigational proficiency frequently become a mere formality.

Improving preflight preparation of the integrated navigational avionics package when there is little time available or when all navigational input data are not available is a completely separate area. Due to the specifics of each type of system, this matter should be worked out in particular detail, and the practical procedures of crew members should be regularly corrected and adjusted.

Thus only all-encompassing and innovative work on the part of the various supporting services will make it possible to ensure accurate, reliable, and safe navigation of modern aircraft along any given route, as well as ensuring constant aircraft readiness to defend our homeland's borders and our national interests.

Cooperation Between Interceptor Pilots and GCI Controllers

90R10003C Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 6-7

[Article, published under the heading "Combat Training in Progress," by Military Pilot 2nd Class Maj B. Kononenko: "The GCI Controller Is Also Involved"]

[Text] According to the tactical air exercise scenario, the "adversary" was to fly a raid on a defended installation from various directions. The plan position indicator (PPI) display at the Air Force regiment command post was strewn with light-blue blips—target returns. As height finder radar operator Pvt V. Urban proceeded to give their altitudes, it became clear that the "adversary" was maneuvering. A pair of fighters scrambled to make the intercept. Command post OIC Sr Lt V. Petrenko, quickly determining the zone of responsibility of each of the GCI controllers, established radio contact with the element leader, Capt V. Chayko.

The interceptors, precisely executing the tactical control officer's commands, sped toward the threat aircraft intercept point. Soon the situation became more difficult: the "adversary" had proceeded to jam. The command post team proved to be alert, however. Switching the radar to a different mode, Senior Lieutenant Petrenko continued precisely guiding the interceptor pilots.

Soon the target return split into two blips. One of them shortly altered heading. An inexperienced GCI controller probably would have become confused in such a situation, but not Petrenko—a specialist 1st class. He decided to "break up" the interceptor pair, with the leader and wingman operating independently. A few minutes later brief status reports from the pilots came

through the speaker: "Target radar contact! Radar lock! Missile away!" Joining up after mission completion, the fighters headed for home.

The other command post specialist personnel, who in the process of controlling other interceptors also had to display tactical sharpness and initiative, also handled the job in excellent fashion.

Another victory had been achieved in air-to-air combat. What had predetermined the victory?

Without question it was first and foremost the pilots' skill, their ability rapidly to gain their bearings in the developing situation. A good deal of credit must also go to the tactical control officer, however, for searching for and guiding the fighters to the threat aircraft. There is also another, no less important factor which helps achieve victory in combat—coordination of actions between the pilot and command post GCI specialist. The pilot must be able to understand the GCI controller instantly and have the ability, utilizing the information he obtains from the ground, to figure out the threat aircraft's intentions. The GCI controller in turn must be familiar with the performance characteristics of the aircraft involved, the capabilities of the weapons they carry, and air-to-air tactics. Without this the pilot and GCI controller cannot avoid mistakes. In support of this statement I shall cite an example from my own experience.

Capt V. Martsenyuk and I were to intercept a high-speed, low-flying threat aircraft. When tactical control officer Capt B. Kobzev noted that he had guided the fighter to a range exceeding optimal, he instructed me to light the afterburners. We had several seconds to assess the situation. Firing the afterburners would enable us to cut range to the target in half, but it would not ensure weapons delivery prior to reaching the limit of engagement. In addition, airspeed would increase to the maximum allowable at the given altitude.

We decided to break off pursuit and, reporting this fact to the command post, returned to base. A detailed analysis of the incident indicated that if we had used the afterburners at the time, not only would we have accelerated to maximum allowable speed but would have been forced to make our approach and landing critically low on fuel.

One sometimes hears, particularly from young pilots, that threat aircraft intercept guidance by GCI controller fetters a pilot's initiative. This is an erroneous opinion. Here is an example of why this is so. At a critical phase of an intercept mission, Maj A. Berzan queried the tactical control officer: "Say threat aircraft's present course!" The same number was repeated. He had been attentively listening to radio communications between threat aircraft and command post, however, and he had a precise picture of the current situation. Therefore, after reporting his intentions to the GCI controller, Berzan executed a totally different maneuver, which enabled him to take up a tactically advantageous position relative to the threat aircraft in a minimal amount of time and to score a "kill" with his first missile.

Difficult situations aloft also sometimes arise due to a poor degree of professional competence on the part of GCI controllers. In a certain subunit they recall an incident where Sr Lt O. Sokhlikov, who was controlling an aircraft in air-to-air combat, realized that he was having a problem with ground control. He immediately reported to the tower that he was getting no returns on his PPI. It was only prompt intervention by the transition-area controller, Maj Ye. Kharchenko, which made it possible to rectify the situation.

Subsequent analysis of Sokhlikov's actions revealed that he had done a poor job of preparing for the drill, in the course of which the pilot was to be attack-vectored to minimum target detection range and at maximum closing speed. In addition, vectoring was being done by eyeball estimate, but without using special instruments and devices, which had also occurred in the past. As a result Sokhlikov, who did not possess adequate experience and skill, was unable to accomplish the job.

The following also sometimes occurs in Air Force units: attempting to make their life easier, some GCI controllers discuss with the pilots in advance the details of an air-to-air engagement. And they also brief them in advance on the threat aircraft's course, altitude, and airspeed. Of course following such "preparation" it is not very difficult to spot and "kill" the threat aircraft on the first pass. It also sometimes happens that a tactical control officer, spotting his own mistake, proceeds to adjust the threat aircraft's actions. This practice in no way promotes development of tactical thinking, initiative and innovativeness on the part of pilots and command post specialist personnel. The most frightening thing about it is the fact that people are willing to compromise with their conscience, forgetting all about honor and virtue.

The pilots also merit criticism. Some of them, after completing the attack, insistently demand of the tactical control officer guidance vectors for the return to base. But everything is written out in detail in the methods workups for each drill. Just memorize it and carry it out! But this is not what happens. In my opinion this is due to the fact that many people rely entirely and solely on instructions from the ground, have not learned to think independently, and simply become lost in a complicated situation. Nevertheless the majority explain their actions as being motivated by concern over flight safety.

Joint training helps raise the level of combat skill on the part of pilots and GCI controllers as well as their mutual understanding and confidence in one another's actions. They are acting in a farsighted manner in those Air Force units in which tactical control officers are asked to take part in training classes with flight personnel in the course of preliminary ground preparation, mission briefing, and after-action debriefings. This enables the tactical control officers to gain a detailed understanding of tactical

matters and the nature of modern air-to-air combat, and to gain an understanding of the specific features of execution of air missions. And it would be useful for the pilots in turn to study fighter intercept vectoring methods and techniques. Unfortunately, as practical experience indicates, they rarely visit command posts, and yet it would even be useful merely to observe the specialist personnel at work and to observe the movement of the interceptor and threat aircraft returns on the radar display.

In addition, in the opinion of Military Pilots 1st Class S. Rastvorov, R. Narushvili, and others, it would not hurt combat pilots to engage in a practice session where they themselves would attempt to vector a fighter to a target. Under the guidance of an experienced GCI controller, of course. I would imagine such classes could be set up on ground preparation days, for the simulation equipment available at the command post provides capability to create various scenarios.

Here is how things are set up, for example, in the regiment with which Lt Col S. Shatravka serves. On the preliminary preparation day and just prior to a flight operations shift, each tactical control officer holds training drills with the group of pilots which he will be guidance vectoring. One controller works with those who will be playing the "enemy," while another works with the interceptor pilots. And the two groups work independently and isolated from one another. Guidance vectoring is also carried out according to this same principle: the controllers work on different channels, which eliminates overhearing radio communications. In order to ensure safety, only the range of altitudes is given for each sortie, with the "adversary" otherwise given complete freedom of action. Thus both the pilots and ground controllers are placed in conditions maximally approximating actual combat, and the outcome of battle is entirely determined by their professional competence.

Of course a defeated pilot can always put part of the blame on the tactical control officer, but one should not forget that he also deserves credit for a victory.

New Book Glorifies Romance of Aviation

90R10003D Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) p 7

[Book review, published under the heading "New Books," by A. Markusha, member of the USSR Union of Writers: "About Those Who Are in the Sky"]

[Text] I must frankly state that I was not only delighted but surprised as well in reading this book (Nonna Oreshina, "Vysokogo neba glotok" [Deep Drink From the Lofty Sky], Moscow, DOSAAF, 1988, 271 pages, 70 kopecks). The author is a woman and not a professional aviator, but she has succeeded not merely in approaching but in entering our winged world, to the extent that she has amazingly accurately and practically flawlessly reflected the atmosphere, purity and lofty nobility of the flying profession. Fairly frequently writers who tackle the job of portraying the world of high altitudes, high speeds, and high G's depict the pilot as, if not a direct descendant of the gladiators, then certainly as a super-intrepid, selflessly fanatical individual, as the quintessential man of action who consciously or unconsciously risks his life.

Writer Nonna Oreshina's virtue in this regard lies first and foremost in the fact that she has succeeded in grasping, soberly appraising, and communicating to the reader that flying is a profession which demands first and foremost affection and knowledge, integrity and dedication, and only after this do all other properties and qualities follow. The following statement draws one's attention: "A person with a small, egotistical soul will never become a good fighter pilot." This statement would seem to be made merely in passing, but it is followed by a clear-cut, very convincing substantiation of this, in my opinion not only absolutely correct idea but an idea which is perhaps rarely encountered in popular aviation literature.

A constant endeavor to see the motivating forces of the flying profession, to understand the essence of phenomena, and to gain an understanding of the "secrets" of the "man-airplane-sky" system is characteristic of Oreshina's book. The pages which relate the daily routine, the ordeals of sport aviators, who by their sweat and blood, so to speak, achieve victories, records, and aviation fame for the homeland, seem to me to be the most successful in this respect.

"Actions geared to show and pretense are terrible, but even more terrible in the flying profession is overcautiousness, for it carries the threat of lack of proficiency," the author quotes the opinion of the older-generation military pilots, and she persistently and with firmness of conviction stands up for the hero's right to take a risk, to independence of decision-making, and the role of the individual in the highest meaning of the term. It is of course a worthy thing to be the executor of some total number of more or less complicated aerobatic maneuvers, but it is more important and preferable to be the author of aerobatic flying elevated to the level of genuine art!

This volume is a collection of sketches which introduce the reader to today's aviation world. In my opinion it would be of interest not only to readers involved in aviation but particularly to those young people standing at the crossroads, who are still undecided about what direction to take, what career to choose.

Flying, if it is freed of the fetters of rigid formality, if it is liberated of the barracks spirit, of the stupid struggle for "discipline for the sake of discipline," makes the flier better, wiser, and nobler. Perhaps herein lies concealed the attractive force of aviation and its ability to captivate the human soul, to bestow on man moments of supreme happiness....

N. Oreshina is captivated by aviation. Before commencing to write this book she experienced parachute jumping and she acquainted herself with aircraft of many types. I find this particularly appealing.

I have no intention of following the old stereotyped pattern of pointing out minor errors in the text. I shall merely note that on certain pages one encounters the term "neubirayushchiyesya shassi" [fixed gear—nominative plural form]. Unfortunately this is a commonly-occurring editing error. It should read as follows: "neubirayushcheyesya shassi" [neuter singular]. Please do not take this comment as a captious "fly in the ointment." I merely would like future editions of this book to be flawless.

As a pilot who went through training before the war and who flew the Polikarpov R-5 [1931-vintage single-engine biplane reconnaissance aircraft], I am delighted to see new aircraft entering service and to witness the marvelous advance of aircraft technology. I can see, however, that this equipment is not only serving today's pilot but in a certain sense is also stifling him, suppressing his individuality. Nonna Oreshina's sketches are necessary precisely because their inspiration lies in glorifying the human element. I know one fact: as long as the Pilot with a capital P continues to live, aviation will live, but if the Pilot with a capital P disappears, we shall have air transport, winged weapons, whatever you like, but not that aviation which is so dear to one's heart, which began with the flying carpet, with a dream of white wings which would be in no way inferior to the unfettered wings of a bird.

Pep Talk For Party Members To Support Perestroyka

90R10003E Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 8-9

[Article, published under the heading "Implementing the Decisions of the 19th All-Union CPSU Conference," by Col Ya. Renkas, candidate of historical sciences: "Leading Perestroyka"]

[Text] (It is advisable to use this article in the course of discussions and exchange of views during the final class session in officer Marxist-Leninist training groups)

* * *

Our society has embarked upon a path of profound revolutionary transformations—political, economic, social, and cultural. A process of restructuring has begun, vast in scope and newness, in the course of which tasks of historic scale are being accomplished.

The Leninist party stands at the head of the masses. Its leadership role in society is unquestionably increasing in present-day conditions, and not only in the sense of general historical trend, as was frequently stated in the past. Today it is growing genuinely and specifically.

At the present time the CPSU's image and prestige with the public rests upon the fact that it is precisely the party which initiated perestroyka. But this respect for the party is distributed far from uniformly among the various elements and organizations. There are those in which it is concentrated, as it were, and there are also those in which it is not yet very strong, since the corresponding party agencies have not become adequately involved in perestroyka.

The people's deputies elections and congress of Soviet legislators have revealed most fully the specific features of the present time and have constituted a strong referendum and support for party efforts and for perestroyka. In spite of a diversity of opinions, the discussion and debate at the Congress was in keeping with the fundamental ideas advanced by the CPSU since April 1985, especially at the 19th All-Union Party Conference. They demonstrated that support by the people also includes sharp criticism of various aspects of activity and serious concern within society pertaining to the forms and methods of restructuring processes, their material and social results. The USSR Congress of People's Deputies spoke out in favor of further intensification of perestroyka, greater resoluteness in its implementation, and more rapid changes for the better in all domains. While supporting the policy of perestroyka, the deputies exactingly assessed progress in its implementation, the performance of Soviet and economic management agencies, as well as achieved results.

Perestroyka has given an accelerated pace to our life, filling it with lofty spiritual meaning. At the same time it also is connected with many difficulties and clash between different points of view, and this is understandable: struggle between the new and the old is unavoidable.

The opponents of perestroyka are hoping for its rollback and are attempting, under the guise of democracy and pluralism of views, to interpret in their own manner Lenin's teaching about party and to impose the idea of "bankruptcy" of the one-party system in the USSR.

What can be said on this score? The existence of several parties is not fatal to socialism. This is indicated by the historical experience of a number of socialist countries, including our country. But a one-party system in a socialist society also does not mean the exclusion of enormous possibilities for development of the democratic process. This occurs if the party itself operates by democratic methods and is supported by a broad system of public organizations which express the opinions, interests, and positions of the most varied strata of society and when its activities are openly monitored by the people. Precisely such a situation is forming today in our country.

As it leads a popular movement for the revolutionary renewal of society, the CPSU rests on the solid foundation of Marxist-Leninist theory. It endeavors in every possible way to raise the theoretical level of ideological-political work, to deepen and intensify productive debate on the pressing issues of socialism, and supports the process of development of genuine pluralism of views and an open confrontation of ideas. At the same time debate, as was emphasized at the 19th All-Union CPSU Conference and at the USSR Congress of People's Deputies, is fruitful only on the soil of socialism and in the name of socialism. They should not lead to political confrontation and to disunity of social forces, which would complicate resolving the problems which are of vital significance to our entire society.

In evaluating a given debate, it is important precisely to determine on behalf of what the debate is being conducted, what positions are taken by the two opponents, and what is their goal: to understand societal processes and phenomena, to analyze them in order to move forward, or to remain silent about tough issues, to impede perestroyka, and to put a stop to democratization and glasnost? What motivates them: genuine concern with genuine problems and search for optimal ways to resolve these problems, or refusal to accept the very idea of renewal of our society? An endeavor to revive the Leninist substance of socialism, to strip it of imposed overlayers and deformations, to give it a new impetus forward, or attempts to return to the old rut, to keep things the way they were when lawlessness, arbitrary rule, bureaucracy, and departures from the fundamental principles of socialism appeared? Precisely when stating the issue in this manner does it become clear who should be supported and with whom one should debate.

The CPSU links the end results of perestroyka with deepening and broadening of socialist democracy. A democratic spirit, as well as keen, lively productivity on the part of the working people—the motive force of development of the new system. Democracy is that healthy and clean air which is the only atmosphere in which the socialist societal mechanism can fully live. In view of this fact, our party and its Central Committee are taking effective steps to improve the political system of the Soviet society and to deepen the democratic spirit of the socialist system. Laws on the workforce, on the enterprise, on cooperative endeavor and individual labor activity, revival of Leninist principles of socialist democracy, the elective principle, a bold swing toward self-government, broad glasnost, and development of cooperative forms of economic management—an entire arsenal of usually powerful political, social, and economic measures have been implemented since April 1955 and have experienced new, powerful development following the USSR Congress of People's Deputies.

Today the party is leading an immense practical work effort aimed at implementing the ideas of perestroyka. We are essentially talking about a large-scale program. As we know, one of the most critical problems today is the food problem. The CPSU links solution of this problem with transforming the agricultural worker into a full and equal proprietor on the land, with reestablishing the balance between city and village, and with social reorganization of the village. What determines the abundance and diversity of what we place on our table? The essence of the reply which was stated at the March (1989) CPSU Central Committee Plenum and USSR Congress of People's Deputies is that practical steps to strengthen the material foundation of the village should be simultaneously reinforced with appropriate efforts to change economic relations in the village. The objective is to open up extensive opportunity for independence and responsibility on the part of the producers and to develop the agricultural market in every possible way.

In particular, there was a great deal of discussion at the Plenum of such a form of conduct of agriculture as leasing land and other means of production for an extended period of time, with the leaseholder enjoying complete independence. Amassed experience indicates that lease relations make it possible more fully to implement the potential of socialist ownership of property. Lease relations safeguard both the interests of society and provide incentive for highly-productive, efficient work effort, and not only material incentive. An individual receives the opportunity to unfold his creative potential in a practical way. The essence of the reforms being carried out lies precisely in this.

Recent party documents have also contained answers to other questions pertaining to CPSU social policy which are of priority significance, in particular the question of how to accelerate the pace of growth of consumer goods and services. The answer lies in building on an accelerated timetable a powerful consumer goods industry. We are talking about speeding up modernization of many light industry and food processing industry enterprises by importing equipment, as well as more extensive participation by heavy industry and defense industry plants in the manufacture of consumer goods. The participation of organizations and companies in foreign countries is being solicited, and joint ventures are being formed to produce higher-quality goods. The target of increasing goods production by more than 37 billion dollars has been set for this year. This incremental growth is to be boosted to 55-60 billion rubles next year.

The following figures indicate average percentage increase of facilities entering service in the current five-year plan over the previous one: outpatient clinics—39 percent; schools—37 percent; children's preschool facilities—14 percent; hospitals—20 percent; clubhouses and recreation centers—54 percent.

The housing problem is an issue of concern to many families, especially young households. It is also a matter of concern to us in the military. The party is doing everything necessary to accomplish the stated task—to provide every family with a separate apartment or individual detached dwelling by the year 2000. Just in the

last 3 years Soviet citizens have received an additional approximately 900,000 apartment units due to an increase in the average volume of housing construction. The number of families moving into new quarters each year is to increase by 50 percent by the end of the next five-year plan. All capabilities will be utilized to attain this goal: government construction, participation by enterprises, kolkhozes and sovkhozes, and development of cooperative and individual housing construction, as well as volunteer labor by the future beneficiaries.

A great deal in our lives depends on successful implementation of a radical economic reform. The party is making a maximum effort to ensure that the Soviet economy becomes dynamic and innovative and to achieve a substantial increase in the effectiveness of societal production. The CPSU considers its strategy in this area to consist in transitioning to an economy of far better organization and efficiency, with comprehensively developed productive resources, advanced production relations, and a smoothly-running mechanism of economic management.

The party is also making an enormous contribution to the development of the spiritual and intellectual domain, and to public awareness. Synthesizing amassed know-how, it has specified ways to achieve further improvement in the effectiveness of ideological work. As was noted at the 19th All-Union Party Conference, ideological work should be distinguished by a close linking with practical societal activities, depth of ideological-theoretical content, full and accurate consideration of the realities of domestic and international affairs, the increased spiritual and intellectual aspirations of the working people, closeness to people, truthfulness, and well-reasoned policy argumentation.

People's consciousness is becoming unfettered today, and approaches toward the forming and shaping of consciousness are changing. The party teaches that opening up of individual abilities and competition of minds and talents should be set in contrast with leveling of the individual; a broad spectrum of opinions and views and intelligent, civilized debate should take the place of phony unanimity of opinion; dialogue, respect for the opinions of others, and citizen participation in formulating and reaching decisions should supplant placing hopes on the force of directives.

Directing the efforts of the people toward accomplishing specific socioeconomic tasks and the development of public awareness, the party is restructuring itself as well and is renewing internal party affairs. The question of a precise delineation of the functions of governmental and party agencies is being placed on the agenda. Today many people are concerned by the discrepancy between the growing CPSU membership and the weakness of party influence on many areas of our work activities. A certain decline in level of party member knowledge is observed. A total of 9 million persons were accepted to party membership over a period of 15 years, between the 24th and 27th CPSU congresses. During this same period 1,100,000 members were expelled. An additional 600,000 persons left the part for other reasons.

A number of complex problems arise with the forming of the party's composition. Questions are posed: How can this process be regulated? How can the party's class character be preserved? At the present time one out of every 10 adults, one out of every nine employed citizens, one out of every five engineers and technicians, one out of every four agricultural specialists, almost one out of every six teachers and doctors, more than half of all writers, one third of all composers and cinematographers, two thirds of all journalists, 71 percent of doctors of sciences, and almost 52 percent of candidates of sciences are party members. The majority of persons at the administrative and management level are party members. There are more than 1 million Communists in the USSR Armed Forces. At the same time it is observed that the level of party leadership over many domains of our daily lives has diminished. As we see, there is a problem, and it must be resolved.

It is high time for the party to establish maximum terms in executive positions. And the major factor to consider should be an individual's ideological, moral, ethical, and professional qualities, his political prestige, an aggressive attitude in the campaign for perestroyka, rather than position held.

CPSU foreign-policy activity is inseparably linked with domestic policy. The party analyzes the international situation and problems which arise in the world arena from a position of the new political thinking. The main objective of party foreign-policy strategy is to secure for the Soviet people the possibility of working in conditions of a firm peace and freedom. For this reason the campaign against the threat of nuclear war and the arms race, for preserving and strengthening world peace and for the future continues to be a main directional thrust of CPSU activity in the international arena.

The party is also playing an increasing role in leading and guiding the Armed Forces, which are also engaged in restructuring.

As was emphasized at the USSR Congress of People's Deputies, "for our people, which has endured a most severe war, reliable defense has been and continues to be an issue of vital importance, just as our Soviet Army has been and continues to be an object of particular concern." But possibilities of ensuring security by political and diplomatic means are increasing in today's world, which makes it possible to reduce military expenditures on the basis of imparting a new quality to the USSR Armed Forces without detriment to our country's defense capability.

Proceeding from this, new and complex tasks face the Air Force. Accomplishment of these tasks is in large measure linked with perestroyka. It is manifested in strengthening party influence on all aspects of the affairs of military collectives, in efforts to achieve high-quality

performance of combat training tasks, full accomplishment of training plans and schedules, and achievement of higher end results. The majority of party members have begun more critically appraising the state of affairs in the units and subunits. As practical experience indicates, an atmosphere of increased demandingness and intolerance toward deficiencies is gradually becoming stronger in many party organizations, and implementation of practical suggestions and critical comments stated by party members at meetings is being rigorously monitored. Accountability reports by party members to their comrades have become an effective means of strengthening party discipline and consolidating an atmosphere of integrity and businesslike efficiency. Evaluation of their personal contribution to perestroyka, regardless of one's position, is presently being practiced more and more extensively. Some receive evaluation at meetings, others at party committee and bureau sessions, while still others receive it in their party character references, but in any case a high degree of mutual comradely demandingness actively promotes strengthening of an atmosphere of responsibility and integrity in the collectives.

Perestroyka is not progressing entirely smoothly, however, and at times it moves slowly and tentatively. Therefore the main thing at the present time is to reanalyze in a self-critical manner and demandingly to evaluate the results of past accomplishment, to determine the true factors impeding the growth of qualitative indices in the training and indoctrination process, and to carry out specific measures to achieve further increase in Air Force operational readiness.

Thus, it was emphasized at the 19th All-Union Party Conference, the CPSU is building a road toward a qualitatively new state of Soviet society and toward a new countenance of socialism via revolutionary restructuring and democratization of our lives in the ideological-political, economic, and social domains, via reform of our political system.

More on Aircraft Maintenance Depot Economic Accountability

90R10003E Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 10-11

[Article, published under the heading "Economic Reform in Action," by Col N. Karasev, doctor of economic sciences: "Stimulating Income"]

[Text] A previous article (AVIATSIYA I KOSMONAVTIKA, No 3, 1989) examined a first model of economic accountability, based on standard distribution of profit.

At the initiative of the workforce, on the basis of Article 3 of the USSR Law on the State Enterprise (Association), a military aviation enterprise may use a second model of economic accountability based on standard distribution of income.

This model can be conditionally represented as follows:

No	Indices	Sum, thousand rubles
1	2	3
1.	Revenues from sale of goods and services	81,390
2.	Material outlays (including depreciation)	44,458
3.	Contributions to social insurance, etc.	1,885
4.	Total income (item 1—item 2—item 3)	35,047
5.	Productive assets tax	2,502
6.	Labor resources tax	1,890
7.	Interest on short-term credit	389
8.	Calculated income (item 4—item 5—item 6—item 7)	30,266
9.	Contributions from calculated income:	
	a) to budget (standard...percent);	2,529
	b) to ministry (80 percent at disposal of Air Force)	1,927
10.	Cost accountability income (item 8—item 9a—item 9b)	25,810
11.	Unrealized income, expenditures, and losses balance	-19
12.	Cost accountability income used to finance economic incentive funds and payroll	25,791
13.	Contributions from cost accountability income, standard allowances:	
	a) to production development, science and technology fund;	5,197
	b) to social development fund	1,782
14.	Payroll fund (item 12—item 13a—item 13b)	18,812

With the second economic accountability model, standard deduction amounts are determined in relation to enterprise income. In our fictional aircraft overhaul enterprise example, revenues from sale of goods and services totaled 81,390,000 rubles for the year. Material outlays, including total depreciation payments, totaled 44,458,000 rubles, while contributions for social insurance, etc, totaled 1,885,000 rubles. According to these figures, enterprise income (gross) totaled 35,047,000 rubles (81,390-44,458-1,885).

Payments for resources are made and interest is paid on short-term credit from enterprise income according to specified standard amounts, after which calculated income remains. In this case it totals 30,226,000 rubles: (35,047-2,502-1,890-389). Contributions to the state budget and the higher organization are made from calculated income, according to standard amounts determined in relation to calculated income, and the remainder comprises the workforce's economic accountability income.

First Instance. Materials intensiveness increases:

$$\frac{\Delta M}{\Delta Ц} > \frac{M}{Ц},$$

where Ц and M are volume of product sold and material outlays in the base period; $\Delta Ц$ and ΔM are their incremental growth respectively in the period being compared.

Whether income diminishes, remains unchanged, or increases is determined by the ratio

$$\frac{\Delta M}{\Delta Ц}.$$

Income decreases when increase in material outlays surpasses growth in sales volume

$$\frac{\Delta M}{\Delta Ц} > 1.$$

Thus it is advantageous for an enterprise not to increase but to decrease materials intensiveness.

Income does not change when increase in material outlays is equal to growth in sales

$$\frac{M}{Ц} < \frac{\Delta M}{\Delta Ц} = 1.$$

In this instance growth in materials intensiveness does not affect the magnitude of income and, consequently, economic incentive funds.

Growth in income occurs when

$$\frac{M}{Ц} < \frac{\Delta M}{\Delta Ц} < 1.$$

Here increase in materials intensiveness causes increase in income and contributions to incentive funds. Within this range it is advantageous to an enterprise to increase materials intensiveness. This situation arises when more costly materials than those used previously are expended on production growth.

Second Case. Materials intensiveness remains unchanged:

$$\frac{\Delta M}{\Delta Ц} = \frac{M}{Ц}.$$

Here income does not increase.

Third Case. Materials intensiveness decreases:

$$\frac{\Delta M}{\Delta Ц} < \frac{M}{Ц} < 1.$$

In our example the figure for contributions to the state budget has been set at 8.36 percent, as well as 6.37 percent to the centralized science and technology development fund and higher-organization reserve, amounting to 2,529,000 and 1,927,000 rubles respectively. Consequently the workforce's economic accountability income is equal to 25,810,000 rubles (30,266-2,529-1,927).

Prior to distribution (that is, financing economic incentive funds, payroll fund, etc), amounts for penalties and other nonperformance results (unplanned) are subtracted from economic accountability income, which increases economic liability for observing contractual obligations and financial discipline. Penalties and forfeits paid out reduce economic accountability income, while received penalties and forfeits increase it.

The unrealized revenues, expenditures, and losses balance, which in our example totals 19,000 rubles, applies to economic accountability income. After this there remains economic accountability income used to finance economic incentive funds and payroll fund: 25,810,000-19,000=25,791,000 rubles.

Contributions to the production development, science and technology fund and to the social development fund are made from economic accountability income, in amounts determined by size. In our example these rates are 20.15 percent and 6.91 percent respectively, while total contributions to the production development, science and technology fund amount to 5,197,000 rubles, and 1,782,000 rubles to the social development fund. The remainder of economic accountability income, minus these contributions, forms the payroll fund: 25,701-(5,197+1,782)=18,812 thousand rubles.

This year almost all aircraft maintenance depots and scientific research establishments chose the first economic accountability model. It is quite probable, however, that it will be replaced by the second model.

The main advantage of the economic accountability model based on using gross income is the fact that it provides incentive to achieve savings in material resources and for the enterprise to achieve high end results. At the same time it constitutes a risk model for the workforce.

For practical purposes of organizing this model it is important to determine the limits within which income provides incentive to economize in material resources and to determine zones where it fails to perform this function. As an example we shall examine the quantitative interrelationship between savings in materials resources and income dynamics. The question is stated as follows: how does change in materials intensity affect income growth?

[See page 13]

In this situation enterprise income increases and there is incentive to reduce materials intensiveness.

Thus the specific features of incentive on the basis of income are determined by the fact that it creates incentive on the part of an aircraft maintenance depot workforce not only to reduce but also to increase materials intensiveness (one situation in the first case). There also exists a "zone of indifference" to savings in material expenditures, when increase does not affect income growth. Consequently, while acknowledging the advantages of income to provide incentive to economize in resources, one must also be aware of the limits. This must be considered in applying the second model of economic accountability.

Causes of Deficiencies in Operational Readiness Reviewed

90R10003G Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 10-11

[Article, published under the heading "Following a Policy of Perestroyka," by Capt S. Prokopenko: "Behind the 'Armor' of Objectivity"]

[Text] At an after-action critique following a tactical air exercise the higher-echelon commander noted deficiencies in the tactical proficiency of certain pilots. A fair reproach, one must admit. Examining the causes of the committed errors, the people in the unit reached the conclusion that the main cause was lack of originality in their actions. This is not surprising. During the period of preparation for the exercise, flight personnel practiced on the same range, with the same target run, and on the same targets. Naturally the same training sorties repeated day after day developed a certain predictable pattern of action. And when the situation changed, some of the pilots immediately experienced difficulties.

The command element and party committee members Communists A. Yugalov, V. Kushnerev, and V. Novikov analyzed deficiencies discovered in the course of the tactical air exercise and, as they say, proceeded to raise holy hell: they held the guilty leader-Communists strictly to account for their errors of omission, recommended that the methods council improve its performance, organized exchange of experience and know-how, etc. In short, they responded to the situation quickly and on the whole correctly.

Nevertheless one of the main reasons for the inadequate proficiency on the part of a number of combat pilots and the occurrence of near-mishap incidents remained uncorrected. It involves planning and distribution of airspace. For a fairly long period of time, for example, the unit's pilots were allocated one zone, or rarely two zones, a fact which first of all engendered excessive situation simplification and, secondly, created difficulties. There frequently arose difficulties in flying training sorties at low level and nap-of-the-earth. And yet we know that undetected approach to the target and the element of surprise offer a guarantee of success to the fighter-bomber in combat.

The opinion became established that this was an objective cause and that nothing could be done about it. Nor

did the party organization succeed in making any serious changes in the situation. It was as if they had decided not to bother "the higher echelon" with the demand that this problem be resolved... It is of course always easier to find guilty parties "locally." But this is not always beneficial.

The other factor continues to exist at present—obsolete trainer and simulator facilities. Equipment has lived beyond its normal service life and continues to function only thanks to conscientious servicing and maintenance by party member N. Kulikov and others.

But there is more than they can handle. For example, wear on mechanical components and assemblies due to the more than considerable use, power line voltage fluctuations, and large temperature differentials are not so easily corrected. Even representatives from the manufacturer acknowledged that continued operation of the training simulator was inadvisable.

This system is also obsolete. It provides capability for the most part to practice on attention distribution, emergency procedures, and instrument flight. While such a narrow range of capabilities is all right for novice pilots, it cannot be satisfactory to the more veteran pilots, for they cannot use it to practice weapons delivery or intercept techniques. Therefore this factor also affected tactical air exercise results to a certain degree.

The pilots are now working on mastering a new aircraft, and once again the question of training simulators arises.

To be entirely fair, we should note that the unit party organization is endeavoring to keep an eye on problems of flight safety. At one of its sessions the party committee heard a report by party member S. Polyanskiy. There were good reasons for his report. It seems that over an extended period of time flight recorder tape analysis had indicated only one mishap-threatening incident, although in actual fact there were more. It was ascertained in the course of his report that subjective assessment prevailed in this domain. A frank, severe discussion held at this party committee meeting as well as subsequent measures produced positive results. Collection and processing of information on flight parameters as well as objectivity of data assessment increased substantially. This also played a role in elaborating a system of preventing near-mishap incidents.

Now following flight operations a pilot who has made a mistake in the air traces a flight data recorder tape record out on tracing paper, together with a flight recorder tape analyst and his flight commander, determines the actual causes of the mishap-threatening incident, and submits a report on these causes at the overall flight operations critique and analysis session. This method develops in a combat pilot not only a self-analysis capability but also excellent moral and ethical qualities.

But then subsequently, as they were discussing problems of ensuring flight safety, party members once again encountered an obstacle. The fact is that the existing form of making entries in pilot's logbooks as well as assigned performance marks fail to reflect the actual situation, fail to reveal a pilot's individual peculiarities, and fail to contain recommendations. They reported their findings to the higher echelon. But apparently they were too timid in doing so, for there was no immediate change.

Both within the unit and elsewhere people are well aware of the fact that the assistant flight operations officer continues to determine deviations from prescribed flight parameters in the old way, by eyeball estimate, and this naturally results in errors. Landings with lateral drift and the aircraft's position relative to the runway centerline are also practically ignored. There are also many other deficiencies as well, which can be corrected only with the availability of modern means of objective monitoring, TV and video recording equipment. At the present time, however, the unit has nothing but obsolete flight data recorder tape analysis aids and binoculars.

Is this another objective factor? Some may say so, but there are specific individuals, officer-Communists, at the higher echelons whose job it is to resolve these problems. But there is no frank, party-minded discussion between them and the unit's pilots. The former take advantage of their position to avoid such a discussion, while the latter fail to display persistence.

Unfortunately such a situation exists not solely in this unit. It has taken root wherever party members and a party organization have limited the domain of their influence and interests "from this point to that point." This is an attitude of the period of stagnation. As was emphasized at the USSR Congress of People's Deputies, it has engendered in practically all domains of our daily life and activities a great many so-called objective factors which justify deficiencies, mistakes, incompetence, inactivity and, most important, the absence of guilty parties.

Practical realities reject such a system. Everything that affects state of readiness and flight safety is a matter of common concern. And I believe that party members—pilots, engineers, and technicians of an Air Force line unit—are not only entitled but are obligated to know how such "objective" problems are being resolved at the higher echelons. Perhaps then there will be fewer such problems.

Kacha Pilot School Faculty Adopts Innovative Teaching Techniques

90R10003H Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 12-13

[Article, published under the heading "Problems of Training and Indoctrination," by Lt Col V. Larin: "Seeing Is Believing...."]

[Text] Heated debate is currently going on at various levels—from the USSR Congress of People's Deputies to

the rural school educator's council—on the paths and directions of restructuring the educational system and training of professional cadres. Innovators in the area of educational science and practice are continuing in their persistent search for forms and methods of achieving intensification of the teaching and learning process and, what is important, are demonstrating in a practical manner the advantages of modern methods of teaching and indoctrination.

Such work is also in progress at Air Force higher educational institutions. There has been discussion in this journal of experience gained in adopting the problems method of teaching in the social sciences departments at the Air Force Engineering Academy imeni N. Ye. Zhukovskiy and elements of the methods of noted educator V. Shatalov in the department of navigation at the Yeysk Higher Military Aviation School for Pilots. They have also achieved interesting results at the Barnaul and other higher military aviation schools for pilots, as well as at engineering and aviation technical schools.

The department of aircraft design and operation at the Kacha Higher Military Aviation School for Pilots imeni A. F. Myasnikov is also making a contribution to improving the system of training future military pilots. The method of symbols used by this department makes it possible substantially to increase the effectiveness of preparing cadets to start flight training, and in the course of flight training it facilitates mastering flying techniques and emergency procedures.

What is the substance and significance of the symbols method? I asked this question of the department head, Candidate of Technical Sciences Docent Col Yevgeniy Leonidovich Borodkin, one of the developers of this method.

"I shall begin by stating that the previously-existing system of cadet flight training can be visualized as three component systems: training section, training simulator system, and training regiment. As our studies indicated, its effectiveness failed to meet today's requirements, since in these conditions the cadet is not so much learning as he is relearning.

"Proceeding several years ago to experiment, we set ourselves the goal of compelling this system to function as an integral whole. Of course it was necessary to coordinate the efforts of the department and to redistribute manpower and resources, which at times caused lack of understanding and opposition by persons who were not at all happy about these changes.

"Partial restructuring of the instructional process required transferring some of the functions of the systems of the training simulator complex and training regiment to the training section system. This made it possible to prepare cadets to begin flight training not just prior to flight training but virtually throughout the entire winter period. By the time Kacha cadets begin dual flight instruction, most are well acquainted with the aircraft cockpit and pilot procedures involved in preflighting, takeoff, landing, flying in the pattern, flying to the practice area to work on elementary maneuvers, as well as emergency procedures. The instructor pilots confirm this.

"The method we employ is based on using the specific features of the human emotional and mental makeup in combination with the most efficient methods of transmission and memory reinforcement of the requisite information by the students."

Colonel Borodkin explained that the purpose of these classes is to create in the cadets prior to commencing flight instruction a solid, stable spatial orientation and picture of the cockpit, thus making it easier for the cadets and instructor pilots in the training regiment.

Preparing the cadets for flight training begins with studying the cockpit layout. Using the reference points method, the students fairly rapidly memorize the layout of instruments and controls. For example, while a flight instructor, working with two or three student pilots, may spend a day or even more on this and tie up use of an aircraft for a lengthy period of time, an instructor in the classroom, using diagrams and cockpit mock-ups, can successfully accomplish the same task in 40-45 minutes with a group of 15-20 students.

After mastering the cockpit layout, students proceed to study the procedures involved in preparing for and during a training instruction flight. The symbols method has made it possible in large measure to eliminate the unproductive and tedious labor involved in copying and rot memorization of the aircraft operating manual. We shall demonstrate this with the following example.

Flying in the pattern and doing touch-and-goes with the L-29 trainer involves 145 different actions. Description of these procedures in the aircraft operating manual takes eight pages of text. The student pilot takes half an hour to read this section. He spends from two to three hours on copying these manual procedures into abbreviated outline form, and then, depending on his abilities, puts in as much work as is needed in order fully to assimilate the material.

The symbols method simplifies and speeds up this process. For example, preparing outline notes on flying the pattern requires not more than ten minutes and takes only a few pages in a pocket notebook.

Experience indicates that if student pilots have thoroughly assimilated preflight and in-flight procedures coded in this manner, the instructor pilot needs only one or two sessions to determine the level of knowledge of each of his students and to drill them in the actual aircraft cockpit. The training of advanced student pilots is done in approximately the same manner. Of course they are assigned more difficult tasks, and the grading criteria increasingly approach the demands placed on a line-unit pilot.

I happened to be present at a training session which Colonel Borodkin held for political directorate officers working in service school units and subunits, officers from Air Force higher educational institutions, political section and staff officers from North Caucasus Military District air forces headquarters. He made a strong impression, both on the basis of what the Kacha people have accomplished in developing and incorporating the symbols method, and to an even greater extent by the potential opportunities it opens up for training and advanced training of flight personnel.

Yevgeniy Leonidovich cited the following figures: several years ago it would sometimes happen that 70 to 80 out of 200 cadets would display unsatisfactory knowledge in examinations on aircraft design and construction, while last year, using the symbols method, the future pilots produced only eight marks of unsatisfactory.

Prior to becoming acquainted with Colonel Borodkin and the work his department is doing, we conducted a poll and mini-survey in several training subunits to determine the opinion of flight personnel about the effectiveness of the symbols method. The responses of all officers surveyed—from training regiment commander to instructor pilot—attested to the usefulness of this method. It is not only being put to practical use—in Maj V. Ladanov's squadron, for example, 12 second-year cadet flying groups worked this spring and summer with the symbolic key, with which they are already familiar—but are also going further, independently programming training drills and increasing the effectiveness of training by achieving more graphic presentation and utilization of technical devices.

At the same time, in the opinion of Colonel Borodkin and other instructors in the department, the potential of the symbols method is far from exhausted, and under certain conditions it promises even greater results.

One of the conditions involves further improvement of the table of organization structure of the training section's subunits. Innovators are of the opinion that a separate department of flight training should be the principal binding link for all elements in the system of training future military pilots.

Frankly speaking, at the present time aviation engineers in many respects are working outside their own specific area, because things have worked out so that the method of reference points and subsequently the symbols method were incorporated into the training process in the interests of higher-quality mastery by cadets of the design, construction and operation of aircraft and to make students more interested in the subject. And then subsequently, having evaluated the actual and potential benefits of the new methods, the boosters of this method went further, encompassing the domain of flight training proper. Particularly since at that time the pilots themselves did not display any regular interest in this innovation developed by the department of aircraft design and operation.

On the other hand Yevgeniy Leonidovich, an innovative individual who is enthusiastic about this innovation developed by his department, and who at the same time is a teaching faculty leader and must have both prudence and foresight, understands full well that the engineers' capabilities are not limitless. Practical implementation of the method involves not only conducting training classes but also continuous improvement of instructional facilities and the need for close contact with commanders and instructor pilots, gathering statistics, as well as analysis and synthesis of experience. All this requires time and manpower, of which we are in short supply, as always. Therefore, while not disavowing their initiative, the engineers would like to share the load with their colleagues.

A second condition or, stated more correctly, an entire area in development of the symbols method is incorporation of computers into the instructional process.

The methods, automated teaching and performance monitoring devices, working models and wired diagrams used in the department have made it possible substantially to reduce the amount of written work. Nevertheless instructors and cadets are still expending considerable efforts on jotting down symbols, sketching diagrams and writing associated explanatory text in the process of scheduled class sessions as well as later for the purpose of memory-reinforcing covered material.

Personal computers help make the job easier and simpler. But, more importantly, computers enable cadets, in the course of instruction and independent study, to model practically any situation, displaying information in the form of text, memory-aiding diagrams or graphic symbols. The first such classroom, equipped with personal computers, is being set up at Kacha. The initiators of the symbols method are counting heavily on computer-aided learning. We therefore feel that our discussion of the education science innovators at the Kacha Higher Military Aviation School for Pilots imeni A. F. Myasnikov is not yet completed. The search goes on.

Mi-8 Pilot Rescues Downed Helicopter Crewmen in Afghanistan

90R10003I Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 14-16

[Article, published under the heading "They Were Decorated by the Homeland," by Col Ye. Besschetnov: "Hour of Courage"]

[Text] The incident took place several days before completion of withdrawal of Soviet forces from Afghanistan.

...A two-ship element of Mi-8 helicopters took off on a reconnaissance mission. Capt Valeriy Popkov, flying wingman for Capt Ilgiz Sharipov, was maintaining precise formation. The ground was covered by a bluish-gray

haze; the mountain peaks, piercing upward into the solid cloud layer, appeared to be holding the clouds aloft. The weather was much to the liking of the helicopter crews: it presented no hindrance to performance of their mission, and it also would enable them to protect themselves against mujahideen missiles en route.

Popkov, following the element leader, plunged into the clouds, and the two helicopters headed out over the mountains for about half an hour.

"Get ready! Approaching objective," Sharipov warned, and proceeded to descend. Dropping back somewhat, Popkov followed him down.

When the helicopters popped out of the overcast, they immediately proceeded to carry out their mission. They fairly quickly determined the location of the mujahideen force and radioed the coordinates back to base. "Outstanding. A gunship section will soon arrive, and things will get hot for the 'spooks'," Popkov noted to himself. He could clearly picture the situation on the ground when rocket salvos hit the mujahideen, who were assembled for the purpose of bombarding the withdrawing Soviet troops....

In the meantime the pair of Mi-8s smoothly executed a turn to the right and, climbing into the overcast, headed for home. The hard part seemed to be behind them. All that remained was to break out on top, head back to base, and land. They expected a safe flight back, but then the unexpected occurred.

They suddenly encountered a large break in the clouds. Popkov, glancing forward every minute or so, suddenly saw the element leader's helicopter shake from an impact and burst into flames. For about five seconds the helicopter kept going by inertia, then proceeded to stall, and headed steeply groundward. Sharipov was able to radio a partial transmission: "0-37.... Starboard engine on fire..." at which his radio went dead.

"He's been hit!" Popkov felt a shiver run over him. He figured that the mujahideen had apparently determined from the sound that there were helicopters aloft, and they were waiting for them. As soon as the leader appeared in the break in the clouds, they immediately fired a Stinger missile at him. And they had hit him.

Valeriy Filippovich immediately radioed back to the command post: "86 is on fire. Going down near Khanabad!"

In order not to lose sight of Sharipov's helicopter, Popkov ignored the danger below (the mujahideen might fire a missile at him as well), banked sharply, and proceeded groundward in a tight, spiraling descent.

Somebody jumped from the burning helicopter, followed by two other figures. Parachute canopies popped open above them. But Popkov was unable to spot where they landed, since he was continuing his spiraling descent. He did see the burning helicopter, however, impact into a hill and throw roiling flames skyward.

Completing his turn, Valeriy Filippovich commenced a landing approach. He spotted a bright orange canopy on the ground by an irrigation ditch. Mujahideen were running toward this spot, firing as they came. Popkov turned toward them and fired off some of his rockets, while his crew chief, Capt Rafail Gilmidinov, grabbing the machinegun, squeezed off short bursts out through the open side window, pinning the mujahideen down.

"Skipper, that would appear to be Sharipov," the copilot, Sr Lt Aleksandr Ryzhkov, spoke up excitedly, pointing in the direction of a figure by the downed parachute.

Popkov did not reply: he was too busy with the mujahideen.

It appeared that former paratrooper Captain Sharipov, who had been the last to bail out, was still alive. But what about his copilot, Sr Lt Ilfat Bariyev, his crew chief, Sr Lt Aleksandr Shchenyayev, and the others on board? If only they too had survived!

Pulling his craft out of its steep descent, he proceeded to ease it on in and set down as close as possible to Sharipov, who was running along the irrigation ditch. He apparently did not hear the approaching helicopter. He finally seemed to realize what was happening as Popkov touched down out ahead of him.

As he was landing, Valeriy Filippovich became aware of the pungent odor of kerosene. "The bastards have shot us," he said to himself. "They have damaged the helicopter. They've hit a fuel line." He realized that the craft could burst into flames at any moment, but there was no time to think about his own safety: he had to act.

"Everybody out, to the rescue of Sharipov and his crew!" he ordered.

As soon as the wheels touched down, Captain Gilmidinov as well as Maj Sergey Shustikov and WO Eradzh Kurbanov, in response to his instructions, immediately jumped onto the ground and proceeded to place assault-rifle fire onto the approaching mujahideen. Gilmidinov, grabbing Sharipov, helped him aboard, and then returned to Shustikov and Kurbanov.

Perhaps it would have been better if they too had returned to their own ship and flown over to the burning helicopter, but the three of them, carried away by the excitement of battle, continued returning fire and proceeded to run up the slope to the hilltop, where the downed helicopter was still burning. They were hoping to provide covering fire for the remaining crew members.

They were about 300 meters from the downed helicopter. Captain Popkov, lifting his craft off, proceeded after them practically in a hover. They had to determine what had happened to the crew.

At this point the mujahideen proceeded to fire rocket-propelled grenades at the low-flying helicopter from

practically all directions. Popkov felt like a sitting duck. Rocket grenades were bursting close by. There would be a burst out ahead, then to the right, then to the left, shaking the craft like a feather, alternately pitching it nose down and tail down. He could hear the sound of bullets and fragments peppering the craft. It looked like they were about to get the rocket grenades ranged in on him. But the three-man team of Shustikov, Gilmidinov, and Kurbanov, pushing forward, were placing fire on the mujahideen and hindering their aim. In the meantime Captain Sharipov had recovered, had pushed the machinegun barrel out the side window, and was squeezing off bursts in the direction of the mujahideen backblast flashes. Although rocket grenades were bursting close by, the mujahideen were not succeeding in scoring a crippling hit.

Popkov reached the burning element leader's craft. There were no signs of life around it. Flames were voraciously consuming the fuel-drenched metal. In the meantime the mujahideen had shifted their fire to the hilltop. The fire even intensified. Popkov maneuvered his craft to evade fire: he would bob up, settle back, and dart from one direction to another. Swinging the helicopter around, he dropped from a hover onto the hilltop. Shustikov, Gilmidinov, and Kurbanov, who had reached the site, continued returning fire while they quickly scanned the area for survivors. Then, providing one another with covering assault-rifle fire, they boarded the helicopter. Shustikov was the last one aboard.

"Skipper, there don't appear to be any survivors," shouted Gilmidinov, striding into the cockpit. "Let's get out of here before they shoot us down."

Popkov nodded in assent and, applying full throttle, streaked down the hillslope. But mujahideen were already clambering up the slope. He swept low over them, scattering them as they tried to avoid being hit by his landing gear. He knew that whoever was able to do so would deliver pursuing fire, as was their practice. Endeavoring to evade fire, he vigorously jerked the controls back and forth, jinking right and left.

He finally reached the required airspeed and proceeded to climb steeply. Finally they were out of danger. Only now was Popkov able to report the situation in greater detail back to the command post. He reported that he had picked up the pilot, that the other crew members had apparently perished, and he reported the location of the downed helicopter.

"How are things with you?" he was asked.

"They worked us over pretty good. We took a fuel line hit, but we were able to isolate the tanks in time. It appears no vital spots were hit. The instruments indicate normal engine operation. I think we can make it back to base."

"Roger, return to base. A pair of troop-lift helicopters and a section of gunships is on the way out."

When the outbound force was approaching the objective area, Popkov established radio contact with the pilot of the lead ship of the Mi-8 pair, Maj Mikhail Zubko, and warned him: "Be advised that you will be receiving fire from all directions. The 'spooks' have rocket grenade launchers and small arms. They may also fire SAMs."

"Roger. Don't worry. We'll take care of 'em," he was assured by Zubko, who was flying as element leader.

Popkov learned later that as they were approaching the objective the Mi-24 section, on command by the lead helicopter, first delivered heavy fire on clusters of mujahideen, after which the gunships flew cover while Major Zubko's two-ship element landed near the burned-out helicopter. Unfortunately they determined that indeed there were no survivors other than Captain Sharipov. The mujahideen had dispatched the other crew members as they were descending by parachute.

Back at the airfield everybody was impatiently waiting for the return of Popkov's crew. The first persons Valeriy Filippovich spotted on the ramp were squadron commander Maj Sergey Bolgov, detachment commander Maj Viktor Yeremin, and squadron engineer Col Ivan Golyshev. He could sense their concern. They were surrounded as they climbed out of the helicopter. Everybody was shaken by the tragedy which had occurred. What had happened out there? They were peppered with questions....

Neither at that moment nor later was there any talk among the squadron's airmen about the courage, daring, and selflessness of Captain Popkov, who, risking death, went in to rescue Sharipov. The airmen would feel awkward about using lofty words and phrases. Every man was deeply aware that this officer had performed a heroic deed. This was also the opinion of the command element which, after determining all the facts and circumstances, recommended that he be awarded the title Hero of the Soviet Union.

* * *

...Valeriy Filippovich is an Udmurt. He was born on 24 March 1961 in the community of Kilmez, in the Udmurt ASSR. When he was six his parents—his mother, Nina Semenovna, and his father, Filipp Fedorovich—took their family and relocated to the Mezhdurechenskiy Sovkhoz in Semikarakorskiy Rayon, Rostov Oblast. His mother went to work on a field crew and his father went to work in the vineyards, while the two boys—Viktor, the older, and Valeriy, the younger—enrolled in school at the beginning of the new school year.

After completing his 10-year primary and secondary schooling, Viktor entered service school and subsequently became an officer with the military construction troops, while Valeriy was attracted to military aviation. He applied to the Syzran Higher Military Aviation School for Pilots and, although his grade point average was not too high, he nevertheless passed the competitive examinations and was accepted.

To this day Valeriy Filippovich is deeply grateful to those who helped him become a military pilot. He is particularly grateful to Capt Vladimir Iskuratov, who was the first to fly dual with him, to instructor pilot Sr Lt Nikolay Kuznetsov, and to section commander Major Fedorov.

"I am grateful to them not only for the fact that they taught me in a patient and conscientious manner," said Capt V. Popkov during our interview. "I shall never forget their sensitivity and attentiveness...."

Things were particularly difficult for him during the first year at pilot school. He was unable immediately to grasp the meaning of what an instructor was saying, unlike some of the other cadets. He usually needed some time for it to sink in. But it was a densely-packed training program. Who has the patience to go over for just one student material which has just been presented? And the fact is that Popkov had good reason for concern that he might be washed out.

Fortunately his superiors and instructors had sufficient genuine concern and patience not to write him off but to spend additional time working with this student. And soon they saw that their work was not in vain. Once Popkov managed to work his way through to the heart of the material, he would never forget what he had learned.

His comrades also frequently helped him in his studies. They could not have done a better job of picking students for their section, Class Section 21: they were all friendly, responsive, and attentive. Cadets Nikolay Zelenskiy, Aleksandr Kulakov (incidentally, Popkov later ran into Kulakov in Afghanistan, when the latter was a captain and squadron navigation officer), Yuriy Bulavintsev, and Aleksandr Gofman, who after graduation remained at the school as an instructor, frequently came to his aid.

Valeriy was gaining a firmer hold on academics. In the second year he began receiving more marks of 4 and 5. He completed his dual flight instruction with no problems. There was not even any need for him to fly any additional dual hours, about which he had been worried at one time. His first solo flight was also successful.

* * *

After graduation in 1982, Valeriy Popkov was assigned to a helicopter regiment stationed in the southern part of the country. He subsequently was stationed for the most part in that region, with the exception of his tour in Afghanistan, performing his internationalist duty.

An important role in his development as a combat pilot was played by Lt Col Farit Shagaleyev, who subsequently was awarded the title Hero of the Soviet Union, and detachment commander Maj Anatoliy Pomytkin, with whom Valeriy first flew copilot-navigator on an Mi-8, but perhaps the greatest contribution toward molding his qualities as a combat pilot was played by squadron commander Maj Sergey Ivanovich Bolgov, from whom Popkov learned boldness, courage, and composure.

Popkov flew copilot for the squadron commander for an extended period of time. Once, in 1986, they had to pick up a wounded Soviet officer from the battlefield. At this same time a section of Mi-24 helicopters was bombing and delivering rocket fire on a rebel concentration in a nearby valley. No sooner had they put down and taken the wounded officer aboard the Mi-8 when the gunship element leader radioed: "A Hind is going down. He's been shot down...."

It seems that as the attacking gunships swept in, the rebels, who were returning fire with everything they had, managed to put crippling fire into one of our gunships with a heavy machinegun. The pilot, Senior Lieutenant Streltsov, did everything he could to soften the ground impact—by adding collective he managed to slow the descent somewhat. He managed to put the now-uncontrollable helicopter into an attitude whereby it first struck the ground with its tail. The crumpling tail boom somewhat cushioned the impact, as a result of which the crew survived impact. Now the crewmembers had to be extracted.

"Skipper, there's the downed helicopter," Popkov pointed to a spot about 60 meters from an irrigation ditch, where the crumpled Mi-24 had settled to earth, its nose jutting skyward.

"Got it!" replied Major Bolgov, veering the helicopter toward the crash site.

Rebels were pouring heavy fire in from all directions, but there was no capability to provide air cover: the gunships were out of ammunition. Popkov went through several tense minutes. Their helicopter sustained damage. The port engine burst into flame. It is true that the fire extinguishing system cut in an quickly put out the flames, but it was a tense moment nonetheless.

Crew chief [flight technician] Sr Lt Aleksey Ibatulin, although under enemy fire, immediately upon touching down proceeded with rescue of the downed crew with his characteristic boldness and determination. With the butt of his assault rifle he smashed in the pilot's canopy and then that of the weapons officer, after which he helped the officers climb out of the gunship and clamber aboard the squadron commander's ship.

Although the squadron commander was the "main character" in this incident, the other crewmembers, including Popkov, also displayed staunchness and skill. And later, when he became an aircraft commander, he provided his men with an example of bold, courageous, determined actions.

...One day in April this year, at a Kremlin ceremony, Comrade M. S. Gorbachev was awarding the homeland's highest decorations to our country's finest. Upon receiving the Order of Lenin and the Gold Star Medal from the General Secretary, Captain V. Popkov stated, a

note of emotion in his voice: "Everything I have achieved in life I owe to the Communist Party and to the Armed Forces. The title of Hero of the Soviet Union pledges me to continue in the future devoting all my energies to serving the homeland and to indoctrinating young military personnel in a spirit of Soviet patriotism and devotion to internationalism."

Courageous actions during that sortie connected with rescuing Captain Sharipov's crew served as the formal reason for nominating him for this highest honor. He displayed genuine courage and heroism at this time. But how many such hours this pilot will have logged in his career! The fact is that V. Popkov flew 2,500 [sic] combat missions while rendering internationalist assistance to the Republic of Afghanistan! What an immense burden of stress on this officer! He withstood the test with honor, however. He withstood the test because he is deeply aware, aware with his entire heart, of his filial duty to the homeland.

* * *

From the editors: As this article was being readied for publication, memorable events took place in Valeriy Filippovich's military career: he was given an early promotion to the rank of major, and in addition he was made a section commander.

Analyzing Causes of Gear-Up Landings

90R10003J Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 16-17

[Article, published under the heading "Flight Safety: Experience, Analysis, Problems," by Candidate of Psychological Sciences N. Nosov: "The Pilot Forgot to Lower His Gear"]

[Text] **Some superiors are inclined to put the blame for this on the pilot alone: is this right?**

* * *

As soon as the retractable landing gear appeared, the belly landing also appeared, as a consequence of a pilot failing to lower his landing gear. Explanations of the causes of this phenomenon began to be formulated from that same time, and measures to prevent such occurrences began to be devised on the basis of these explanations.

When analyzing such incidents and determining their causes, different officials emphasize different factors as key element exerting a degrading effect on a pilot's performance. Proposed methods of combating such incidents are directed chiefly toward neutralizing these factors. Some commanders maintain that such an incident could have been avoided if the pilot and the other crewmembers had performed the procedures as prescribed by the manual: check and recheck to ensure that the gear is down and locked on the basis of the gear indicator lights. And since the gear was not down, this means that no such check had been made. Consequently the pilots had displayed indiscipline and irresponsibility. Therefore the "guilty parties" must be punished in order to prevent future gear-up landings, to keep others from making the same mistake.

Others are inclined to the view that the pilot simply forgets about the gear and that he must be reminded. This is why they install gear indicator lights, annunciator panel "Extend Gear" warnings, and gear warning horns. Some superiors ascribe pilot "forgetfulness" to the fact that at this moment he is experiencing powerful negative emotions. For example, he learns that a friend has been killed. This reasoning produces primitive recommendations such as the following: endeavor not to allow negative feelings to arise during flight, endeavor psychologically to condition the pilot, etc.

One also encounters the view that cases of failure to extend the landing gear occur as a result of disruption, for some reason, of practiced flying procedures habit or pattern. For example, because the pilot had to perform some additional actions. According to this view, in order to avoid incidents caused by this factor it should be made clear to the pilot that when a pattern is disrupted the occurrence of mistakes is possible, and therefore one should be particularly vigilant....

Yes, there exist many different explanations of why such incidents have occurred. Nevertheless, in spite of the considerable attention which has been devoted to gear-up landings, such incidents continue to take place. Why is this? Apparently because some important element has been omitted in analyzing them. Let us endeavor to perform an analysis.

In my opinion, lack of a detailed analysis of the subjective aspect of this type of occurrence constitutes such an error of omission, from a psychological standpoint. In order to obtain a complete picture of what has happened, one must recreate the situation which led to the error, from the standpoint of the person who made the mistake, to see everything with his eyes, as it were. We must establish his thoughts, emotions, and intentions. In other words we must thoroughly understand the contents of the pilot's consciousness.

We shall examine a typical incident from this standpoint. For greater clarity we shall take an aircraft with a crew of more than one.

At that moment when the pilot gave his flight engineer the order to lower the gear, the engine instruments showed a momentary fluctuation. Having receiving the order but not yet having executing it, the flight engineer proceeded to adjust the engine controls. But there was no serious problem; the gauges "settled down." After assuring himself that engine operation was normal, the flight engineer failed to return to the extend landing gear sequence and, failing to report back gear status to the pilot, proceeded to perform his other regular functions:

monitoring performance of specific aircraft systems and readying to execute the next command in the approach sequence: extend flaps. Following flap extension the pilot, not having received confirmation but knowing that the gear should be down, asked the flight engineer: "Gear down and locked?" to which the latter firmly replied: "Down and locked."

The emergency warning panel and gear indicator lights were working properly, but the warning horn had just been disconnected during final approach descent when they had reduced airspeed. The result was a gear-up landing.

As the aircraft made contact, the flight engineer and the other crewmembers initially assumed that the landing gear had collapsed. It was only some time later that they noticed the gear indicator lights showing gear up.

"I was so sure," the flight engineer later testified, "that I was unable even to articulate the thought that I could have made a mistake."

Thus failure to lower the gear was due to the flight engineer's feeling of certitude that he had lowered the gear, not due to forgetfulness or negligence. It is for this reason that he failed to verify gear down and locked by checking the gear indicator lights and the annunciator panel. Why check something about which one is sure? Consequently designating this error as an "omission" is to record only the external aspect of the procedure (the flight engineer had failed to perform a procedure in the approach sequence—he had failed to lower the gear), but from an internal aspect there was no "omission"—the flight engineer had failed to perform this procedure because he was sure that he had already done so.

The occurrence of a feeling of certitude that one has performed an operation which actually has not been performed is called the "completed execution phenomenon." In this instance the flight engineer made a mistake. By mistake we mean he had deviated in performing that regular sequence of procedures which this crewmember knew how to perform correctly, was able to perform correctly, and intended to perform correctly (AVIATSIYA I KOSMONAVTIKA, No 6, 1989). An airman does not bear responsibility for its occurrence, however, just as for the occurrence of illusions of spatial attitude.

What we must do here is clearly distinguish between the cause of the error and the cause of the mishap. If a mistake is corrected in time, there will be no mishap.

Various means of display and warning as well as the requirements specified in the aircraft operating manual that crewmembers must check and recheck to ensure that the gear is down and locked are aimed at preventing such an incident. It would seem that three means of warning—the gear warning horn, the gear indicator lights, and the "Extend Gear" warning message on the annunciator panel—would guarantee precise determination of the status of the landing gear. But the fact is that the gear warning horn is disconnected as a hindrance to the pilots, while the warning lights and message were designed without taking into consideration the psychological factor—the possibility of occurrence of "completed execution phenomenon," by virtue of which the pilot simply does not pay attention to them.

The manual also prescribes that the crew shall verify that the gear is down and locked. As we explained, however, the flight engineer does not do so because he is sure of his actions. But what about the pilot in command, who according to the book should check the actions of the other crewmembers? One can understand the good intentions of the people who wrote the operating manual: the aircraft commander bears personal responsibility for the flight, and therefore he should personally check on everything, and since man is prone to error, it would therefore be better if he makes a positive check on the actions both of the other crewmembers and his own as well.

We would seem to be dealing here with concern for safety. But let us examine the situation from a psychological standpoint. In the first place the act of verification is a second action parallel to the principal action—flying the aircraft—which is very important and very complex. In addition it is an action which is psychologically alien to him, an action which is not logically incorporated, and therefore an action which requires that he divert his attention. In other words the pilot is supposed to be performing two different kinds of actions simultaneously. No matter how simple these actions may be on the face of it, nevertheless it is very difficult to combine them psychologically.

In the second place, verification engenders interpersonal conflict between the aircraft commander and the flight engineer. Naturally the crewmembers are well aware that rules are rules and that they must be carried out to the letter. The requirement that the pilot personally verify that the gear is down and locked is from a purely human point of view, however, an indication of distrust of the flight engineer. If the pilot trusts his subordinate, he will not check on him. And how could he not trust him, one would think, since they have made hundreds of flights together?

Thus the requirement that the pilot personally check to ensure that the gear is down and locked during the landing approach sequence per se introduces a negative element into performance of the task of flying and conflict into interpersonal relations between crewmembers.

This happens in large measure because both the gear warning provisions and the landing sequence procedures were devised without considering the psychological patterns of the processes of crewmember work activity, and for this reason they prove sometimes to be ineffective.

Only analysis of the contents of the consciousness of the "erring party" has enabled us to reveal the actual reasons for failure to lower the gear. And incident analysis

procedure guaranteeing high credibility of results is fairly complex. It includes special psychological methods and is performed by a qualified aviation psychologist. This complexity is the reason why the fact that the "completed execution phenomenon" long remained undiscovered, while the attention of investigators was focused on factors attendant to the work activities but not causally linked to the mistake: emotions, disruption of accustomed pattern of actions, etc. This in turn predetermined the fact that preventive measures have proven ineffective. From the standpoint of the results of our analysis it is a matter of indifference why the "completed execution phenomenon" arose—there are many different factors which disrupt the flow of activity. They cannot all be considered and neutralized. Efforts to prevent mishaps of this kind should be directed not at combating attendant causes but at ensuring adequate aircrew awareness of the current situation and at eliminating incorrect understanding of the situation which, incidentally, is technically very easy to do.

In conclusion I would like to emphasize that one and the same incident can be a consequence of different psychological causes and, in like manner, one and the same cause can form the basis of the most diverse incidents. For this reason on each occasion one must perform a special psychological analysis of the contents of the consciousness of the "erring party," no matter how obvious the causes of the mistake and incident may seem to be.

New Organization of AF Engineering, Technical Support Services Proposed

90R10003K Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 18-19

[Article, published under the heading "Problems, Inquiry, Solutions," by Maj Gen Avn A. Bystrov: "In Form and Content (Aviation Engineer Service: Fourth Reform)"]

[Text] **Many new ideas and valuable, constructive suggestions were heard at the USSR Congress of People's Deputies, implementation of which should without question finally get moving the resolution of many issues and have an appreciable effect on the state of affairs in our society. As has been noted, profound changes in the activities of higher-echelon officials and agencies are becoming an urgent task in improving management. In particular, it was acknowledged essential, while sequentially restructuring the system of management, to remove from it all excess elements which impede forward movement. The following is a legitimate question: is the mechanism of management of the structural subdivisions of the Air Force, and the Aviation Engineer Service in particular, sufficiently effective and efficient in the new conditions? This is a far from idle question. Ensuring operational readiness and flight safety as well as—and this is a by no means unimportant element—the social status and legal protection of Aviation Engineer Service [AIS] and technical subunit personnel is linked to it to a considerable degree. The following article by Maj Gen Avn A. Bystrov discusses the role and place of the AIS in the process of restructuring.**

* * *

Today's Air Force contains a great many various support services. The size of many is comparatively small, and their capabilities are limited. This category includes the Aviation Engineer Service, in spite of the fact that it performs multilevel, complex, and critical tasks. Is it fair for a large workforce, consisting of specialist personnel in four main specialization areas, a workforce which defines the dimensions of units and combined units, to be equated in the "table of ranks" with subunits numbering a few dozen persons? Nor should we forget that, in connection with substantial qualitative changes in aircraft and armament, there has been a substantial increase in the influence of aviation engineer support on the end results of military labor. In the past AIS personnel for the most part kept aircraft in proper working order and readied them for flight operations, while accuracy characteristics of weapons delivery were determined entirely by the skill and proficiency of flight personnel; today these results are determined in large measure by how aiming and targeting systems are tuned and adjusted, and by how target en route and targeting data are fed into onboard computers. The role played by AIS specialist personnel in accomplishing the tasks of direct combat employment of aircraft systems has become commensurable with the role played by aircrews aloft. A great deal is being done by the many thousands of AIS personnel in the area of ensuring flight safety, training and indoctrination of personnel. Then why is it that AIS personnel, one might say, have had their rights and social status infringed? If form does not correspond to content, how can it be corrected in conditions of restructuring the table of organization of the Air Force?

An examination of this question indicated that designation of Aviation Engineer Service as a sluzhba [service] is historical in nature. But first a few words about the term "sluzhba." It reflects the professional orientation of a job, as well as affiliation with a given job, trade, profession, or occupational specialty.

How did the term "inzhenerno-aviatsionnaya sluzhba" [aviation engineer service] originate? We find here a certain logical pattern. At the beginning of the century aircraft were simple in design and construction, and flights were of a demonstrational nature. Aircraft were prepared by mechanics and motor mechanics, that is, specialists of a single area of specialization, and they were supervised by a senior mechanic, who was essentially the service chief [nachalnik sluzhby]. This was the first technical service in aviation. For a long period of time mechanics, technicians, and engineers of this service comprised the overwhelming majority of aviation specialist personnel. Up to 1934 the Air Force Engineering Academy imeni N. Ye. Zhukovskiy trained only

mechanical engineers. This situation was also reflecting the fact that the position of Chief Mechanical Engineer of the Air Force was introduced in 1933.

A Chief Mechanical Engineer of the Air Force staff organization was established in 1933, tasked with handling matters pertaining to aircraft maintenance, repair and overhaul, formulation of a uniform technical policy, and improving the system of command, control and management of engineer-technician personnel. In the mid-1930's he became assistant to the chief of the Workers' and Peasants' Red Army Air Force, and subsequently became a deputy commander in chief of the Air Force. The first Maintenance Service Regulations (NTES-33) were issued in 1933; these regulations correctly designated technical subunits as service category.

An active search for and adoption of the most acceptable Air Force table of organization structure continued up to 1941. The prewar years can be considered the period of the first major Air Force reforms. In mid-1942 the Politburo and State Defense Committee analyzed the results of the initial period of the Great Patriotic War and military aviation's role in the war. A reform of the Air Force was carried out on the basis of the resulting decision: in June 1942 the Technical Maintenance Service was redesignated the Air Force Aviation Engineer Service.

Of course during the harsh war years it was out of the question to conduct scientific research. The new qualitative state of the aircraft maintenance and overhaul service, however, was already recognized at that time.

The postwar period was characterized by rapid development of aircraft technology. Jet-propelled aircraft equipped with complex electronic gear began entering military service at the end of the 1940's and beginning of the 1950's, and a new service was formed in the Air Force: an aircraft avionics service. This resulted in an unusual situation, unique in the world's air forces: four additional services became organizationally part of another service (aviation engineering).

A third reform was carried out in the Air Force in 1954. It was a consequence of revolutionary changes in the qualitative state of aircraft, weapons, and air-force tactics, and of a radical improvement in the intellectual and professional level of pilots, navigators, engineers, technicians, servicing and support unit personnel.

By this time the Aviation Engineer Service had quantitatively and qualitatively outgrown the designation of service; what we had was a de facto Air Force inzhenerno-tekhnicheskiye voyska [engineering-technical troops]. Unfortunately military scientists and specialists "failed to notice" this fact, as a consequence of they remained (and remain to this day) in the status of a service, in an organizational and social respect.

I foresee objections. Organization of engineering and technical personnel is also classified as a service in the air forces of other countries. That is indeed the case. The fact is that the military aviation of large countries develops approximately in the same way, and terminology is also borrowed. The only difference is the fact that in other countries preference is given to action, while in this country it is frequently given to form, and if an organization was erroneously named a service, then everything possible will be done to reduce it to a service status. This status of the Aviation Engineer Service makes it impossible maximally to realize the potential of its structural subdivisions as regards further increasing unit operational readiness and flight safety.

A fourth fundamental reform is presently in progress in the Air Force—the largest and most revolutionary reform as regards consequences.

I would like to share some observations favoring the reform in progress. I believe that we must first of all scientifically formulate a conceptual edifice corresponding to the level of the reforms being carried out. This determines to a considerable degree what place and what role will be assigned to the corresponding structural subdivisions.

Here are several examples. The term "aviatsionnaya tekhnika" is defined differently in the Aviation Engineer Service Regulations (NIAS-78) and in the Military Encyclopedic Dictionary. In the former the term is defined as piloted and unmanned aircraft, their powerplants, equipment and armament, aircraft-launched weapons, training devices and technical means of maintenance and repairs, while in the latter source the term is defined as aircraft, their equipment and armament. Ground means of aircraft preparation and flight operations support are also sometimes included within the term "aviatsionnaya tekhnika." According to these definitions, the term "aviatsionnaya tekhnika," in addition to aircraft, can also extend to fuel tanker trucks and ground power equipment, test instruments and maintenance tools, ground towing vehicles, and a great deal else.

In my opinion this is wrong. Practical experience has shown that the overwhelming majority of Air Force personnel define the term "aviatsionnaya tekhnika" as piloted and unmanned aircraft together with their equipment and powerplants. Obviously this is a correct definition. Let us take a closer look at the practical activities of the Aviation Engineer Service, and we shall see that the main thing is maintaining aviatsionnaya tekhnika, as personnel define it, in proper working order and combat-ready. Unfortunately the table of organization of Aviation Engineer Service control and supervisory agencies and subunits is such that the result is an artificial limiting of the scope of practical activities of Air Force engineers and technicians, and this has relegated them to the status of a service.

Are aircraft alone the main focus of Aviation Engineer Service activities? Is it correct to state the question in this manner? We can obtain an answer from analysis of a second example.

The terms "tekhnika voyennaya" [military equipment, military hardware] and "vooruzheniye" [armament, arms] are in regular use throughout the world, including the USSR. Armament as a component part of military equipment includes the following: weapons (ammunition and means of delivery); devices for detection, target designation, guidance, control, as well as other technical means with which subunits, units, naval ships, and combined units of the various branches of the Armed Forces are equipped.

As we see, the term armament includes piloted aircraft and unmanned aerial vehicles. Why is it that the Air Force has not yet adopted the term "vooruzheniye" [armament]?

In connection with this the term "vooruzheniye aviatsionnoy chasti" [aviation unit armament] (combined unit, large strategic formation) is proposed, A term which should apparently encompass the following: aircraft, aircraft weapons, diagnostic equipment, maintenance equipment, flight simulators and training devices, aircraft shelters, removable and ground equipment, and technical means of flight operations support which are part of an Air Force unit's tables of organization and equipment. Of course new military organizational units of the engineering and technical troops type, with corresponding command, control and indoctrination agencies, are required for maintaining the armament of a unit (combined unit, large strategic formation) in proper working order and combat-ready, and for aviation engineer support of combat training and combat operations.

Of course the new structural subunits (from Air Force squadron to Air Force commander in chief's administrative staff) should be headed by deputy commanders for armament and, at the Air Force level—a deputy commander in chief for armament. Appropriate new pay and ranks should be specified for these positions....

But what can adoption of the above proposals offer line units? Of course thorough scientific study will be able to provide a more precise answer to this question. But one can already state with a certain amount of probability that establishment of Air Force engineering and technical troops will make it possible better to handle matters pertaining to combat training of Air Force units and combined units and to boost them to a higher level of operational readiness, which is fully in conformity with the points of Soviet defensive military doctrine. In addition, with the active participation of scientific research institutes and higher educational institutions it will be possible to organize purposeful accompanying scientific support of unit combat training and to ensure scientific forecasting of the results of aviation engineer support of units' combat operations.

A new field of practical activity on the part of engineering and technical personnel is for the first time in history being examined as a single integral whole: maintaining the armament of an Air Force unit (combined unit, large strategic formation) in proper working order and in a combat-ready state. This will make it possible to encompass with the domain of activities of engineering-technical troops all areas of combat and operational readiness of Air Force units, their combat training and flight safety, as well as personnel training and indoctrination. Thus what is being proposed is a modern approach to solving the problem of improving the practical activities of engineering and technical personnel by means of a new level of organizational measures.

Finally, the proposed changes will make it possible to determine a strategy of resolving matters pertaining to further boosting the level of combat readiness and flight safety over the course of long-term restructuring of the Air Force, which will make it possible to organize a system's response to operational and tactical tasks of aviation engineering support. On the whole one can postulate with assurance that engineering-technical units of the new type will able to handle missions of considerably greater scope and volume, with better efficiency and quality than the presently-existing Aviation Engineer Service.

The author is not claiming a finished solution to the questions stated above, but is merely presenting observations, and invites interested readers to present their thoughts on these questions.

Precision Formation Flying By MiG-29 Flight

90R10003L Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 22-23, 26-27

[Article, published under the heading "Thoughts Aloud," by Military Pilot 1st Class Maj V. Parkhomenko: "I Am a Pilot by Profession"]

[Text] The residents of this town have long since become accustomed to airplanes taking off and landing and to sonic booms. It would seem that aviation had no more surprises for them. But once an aircraft with twin tail fins passed almost silently over the edge of town. Once again the townspeople displayed piqued interest toward us military aviators. In the fall of 1988 they learned that MiG-29s were flying above their town.

Just who are these pilots? What do their lives entail? How did they develop their level of proficiency?

A man's value lies in his ability to do his job, whatever work he may engage in for the benefit of others. Unfortunately the flying profession remains a puzzle to our young people. Perhaps it is only the older generation which remembers that respect and even thrill of excitement aroused in them by the men of this heroic profession. I personally am hard put to recall a truthful, objective film about the life and career development of the modern pilot. Pilots on the screen are most frequently rather wild fellows who take liberties either in affairs of the heart or in the air.

It is probably due to movies of this kind that people persist in the view of pilots as a highly-paid elite garbed in a dashing military uniform. The general impression is that pilots get great pleasure out of their flying activities, and earn big money to boot.

Incidentally, statistics indicate that the standard of living of flight personnel is the same as that of the majority of our population. In order to ensure that everybody understands this fact, we must speak in frank terms about our military aviation and about its problems. The attitude of working people toward their military should be grounded on understanding and knowledge. A veil of "secrecy" in these publicity matters sometimes leads to a feeling of resentment toward the people's defenders. I see my task as showing the flying profession through the prism of my own personal perception.

Special Scenario

Training was in progress. Preliminary preparations were followed by practicing aerobatic maneuvers and formation flying. This is the whetstone on which the fighter pilot's skill is honed. One gains a feeling of one's aircraft when flying in tight formation. And when there is a high degree of precision formation flying (which does not happen so often), one feels a sense of unity between oneself and one's aircraft. From this point on there is no longer need for that vast number of instruments, indicator lights, dial pointers, switches, and displays—stick and throttle are all one needs to perform heart-stopping air-to-air combat maneuvering. From this point on it is as if you are not flying the airplane but that you yourself are flying.

This is the summit of skill! The ideal! Pilots spend years striving toward it, through hundreds and thousands of flights. Nevertheless it is highly likely that only a very few can say: "Yes, I fully understand it. I have been up there." It is precisely during these moments of that inimitable, not-of-this-earth feeling of flight that pilots love their profession; it is also for this reason that they strive toward the ideal of skill.

...Tomorrow our flight will be working on mastering tight echelon and diamond formation flying. We shall be practicing them for use in a combat environment (air defense penetration, escort of other air components, formation flying in clouds), for shortening time required for join-up into elements after takeoff, and for landing in minimum time. These are not easy tasks.

Flying in tight formation is nothing new for the pilots of our regiment. Nevertheless one feels psychological tension, for recommendations will be issued on method to be used for learning and mastering close-formation flying. This makes an imprint. One must play the role of a novice, as it were, for whom everything is new and strange, and one must pay attention to all the tiny points and commit everything to memory, in order later to put them on paper in an intelligent manner.

We were preparing for the flight, once more going over the mission assignment. Each pilot in our four-ship element would be writing a report after the flight, a report which would specify what difficulties could be expected in the air by a pilot proceeding to master the skill of tight-formation flying.

I would be number four man in echelon formation, and bring up the rear in the diamond. It does not mean special confidence in a pilot to place him at a difficult spot. Any of the pilots of our flight could be placed there. It is simply that specific pilot names were assigned to this formation, and we have already flown as an element and know what we are capable of doing.

It appeared that we had discussed all details of the mission. We analyzed the entire flight with model aircraft, walking through all the forthcoming maneuvers. There is a pilot in our element whom we highly value for his particularly thorough knowledge of aerodynamics. His knowledge helps us choose safe minimum lateral and forward separations in formation, step-up and step-down altitude differences in relation to flight level.

The day of the mission dawned. Suddenly we were told that our flight would be filmed. That made no difference to us, but who would be the intrepid cameraman doing the filming? It turns out that he was an old acquaintance of ours, who was experienced at aerial filming. It is too bad that all his films are classified FOUO. Just a few frames have made it into AVIATSIYA I KOSMONAVTIKA, SOBESEDNIK, and KRASNAYA ZVEZDA.... It would be nice to show them to our young people!

Echelon and Diamond Formations

We took off in two-ship elements. I flew in the led element. Lt Col V. Kakhanovskiy was my element leader. He flies smoothly, even "politely," one might say, almost like A. Tolubayev, who was flying the cameraman. I was familiar with his manner from two-ship advanced aerobatic maneuvers flying. The two of us had flown dozens of loops and chandelles as well as various combat maneuvers—"lariats," "seashells," and "crabs." We could anticipate each other's every move. We caught up with the flight leader's element, led by Col V. Statsenko. He bore the psychological responsibility for creating conditions for his three wingmen.

We formed up in echelon—the first formation. It was more difficult for me than the others, or maybe it just seemed so. The slightest deviation from formation is passed on to the trail pilot with increased amplitude. One is forced to use one's "little tricks": to use prediction, to picture the flight in advance. A lead of just one or two seconds. In short, one must predict. This helps. But nevertheless the line of aircraft seems a living, breathing being. Light, almost unnoticed oscillations are preserved.

I caught myself wondering what we looked like through the camera lens at that moment. Worse than those U.S. aircraft in the photograph we had looked at prior to

departure? We are not NATO pilots and do not use automatic devices to maintain formation. We can get along without them. Let that bearded flying cameraman show with his film that we too are made of stern stuff. Photographs are the best evidence.

The cameraman radioed a request that we demonstrate a formation break. How is this accomplished? We break on the flight leader's command. I roll right (the thought again runs through my mind: well, just like on the foreign picture postcard!). The cameraman thanked us. I wonder how it will turn out on film!

The flight leader gives the command to join up. That's it! Keep your attention focused! I concentrate my attention on the join-up maneuver. I move in on Kakhanovskiy from the right, and the two of us join flight leader Statsenko's element.

We proceed to form up into a diamond.

"What so hard about that?" the uninitiated observer will ask. But it is not so simple a matter. The aircraft are extremely close together. A wake trails out behind an aircraft, just like an ocean liner, with the difference that in the air it consists of an invisible interweave of vortices streaming off the wings and emerging exhaust gases. Get into that wake turbulence, and you'll have a time of it. Therefore things are not at all so simple as might sometimes appear on the surface.

I proceed to change formation. I had adjusted the trim control in advance to reduce forces on the control stick. I smoothly pass close over Kakhanovskiy's aircraft. I have visual contact with the entire flight. The formation is "breathing," but we are the only ones who see this. Flying technique is precise. Therefore with certain flying skills it is easier to maintain close formation than to hold position in a dispersed formation. The greater the distance, the larger the errors. But at these quarters the slightest deviations in forward spacing are immediately picked up visually by the pilots, and their hands carry out adjustment.

One's subconscious operates almost automatically. Up-down, roll left-right. Foot pressure left-right. One can see the ailerons and horizontal tail moving, and yet the aircraft do not budge. Just like a truck driver "walks" the steering wheel right and left, and yet the vehicle moves straight ahead.

My aircraft was now trailing, but still high. We were observing safe procedures. That invisible turbulent wake was roiling down below me. If you get into it, it will flip you out so you don't know which direction is up! The hot stream of exhaust gases can also flame out your engines.

I was still a bit high, too high for a correct diamond formation. I noticed that my hands, like those of a wrestler, were tightly gripped on the throttle quadrant and control stick. I tried to relax my muscles, which were starting to go numb. My movements became smoother and more coordinated. I began periodically monitoring my own body and breathing.

Through my windshield I could see only the nose and cockpit of the lead aircraft, with my aircraft's fuselage obscuring the rest of it. I write: "my aircraft's fuselage," observing the rules and usages of the Russian language. But we pilots put it somewhat differently. In pilot's language I would say: "The flight leader's nose and cockpit are covered by my fuselage." Nobody taught us this language. But it takes shape on its own at some stage of one's flying experience. Probably because pilot and aircraft are truly an inseparable concept.

A new word appeared fairly recently in aviation—"kompleks" [system]. And we started saying "system" in place of "airplane." Yes, we have apparently forgotten that this system also includes the pilot—a living being. The operation of all systems depends on his reliability. Unpleasant occurrences very rarely take place due to equipment failure. Statistics are implacable. Man plays a leading role in malfunctions. Yes, it is usually the human operator who is at fault. It is high time that one realize this fact and treat the pilot just as we treat the aircraft: with care and affection, engaging in preventive and improvement efforts. Reliable operation by the "pilot-aircraft" system requires appropriate preparation of both.

Thus I see only half an airplane out ahead of me. I smoothly edge the stick forward. I gradually ease down into position. I can sense from barely perceptible signs that I am approaching the top of the turbulent wake. There is a slight change in the overall background noise. There is a slight vibration of the control surfaces. That's enough. No lower. I radio: "Right behind you in position."

At this moment I am not thinking about the photography. No time for that! My entire attention is focused on holding position in formation. And that position is so "slippery"!

The flight continues. We gradually get the hang of things. I now reestablish visual contact with the wingmen on the left and right—the diamond is slightly askew. They can't see this from their position. I tell them. Good lads! They even up the formation. Now our diamond is perfect!

But the hardest part still lies ahead. We formed up in level flight. Now it is time to go to work! The flight leader gives the command: "Banked turn." Our leader is something! He skillfully puts his aircraft into a turn to the left. We follow him synchronized into the maneuver. I am surprised at how easy it is to maintain position. We must be positioned in a single plane. The flight leader is slightly below me, although he is also hanging suspended above us. To him it seems that he is at the top of the formation. I am about to let him know, but he apparently has already figured it out. He eases up a bit. Now everything is just right.

The two-seater carrying the cameraman comes into view. It will later appear on the film and on the screen that the four-ship element of MiG-29 fighters easily and smoothly executes maneuvers in various formations. We will only smile.

Mission completed. We break away in pairs.

Fighters Plunge Into the Clouds

How easy it is to fly as a two-ship element after a four-ship flight! Much less attention is required. I recall when I was a student pilot at flight school, and later as a lieutenant, what tension and concentration I expended on holding formation. I could see only the lead aircraft, nothing more. I could not spread my attention enough, although I had done extremely well in the psychological screening during the enrollment process. Now I was again flying in a two-ship element. But what an enormous difference in sensations! My eye on the leader, and also on the airspace all around. Just let a threat try and sneak up on me....

I came to a conclusion: increased potential and reserve potential for increasing a pilot's reliability lie in making training tasks steadily more complex.

We would soon be landing as a two-ship formation. This was nothing new, but we should not relax our attention. Takeoff and landing are always the most critical elements of a flight. No wonder they teach pilots to fly according to the principle "Takeoff-Landing, Takeoff-Landing." They don't let them solo until these two elements are mastered.

A white sea of clouds stretches out below like fluffy snow. I glanced at the rear-view dogfight mirror (of course without losing visual contact with the lead aircraft). I saw a face darkened by the glaring sun at high altitudes. I smiled back at myself with my eyes. Everything else was hidden behind the oxygen mask. I was in a good mood, for we had completed the mission. The commander was pleased. His element plunged into the clouds first, followed by Kakhanovskiy and me.

We plunged into the undercast, and it took my breath away! I had never seen such dense clouds. Visibility was practically zero. It is one thing when you have the lead aircraft fully in sight, but now.... Yes, once again calmness and self-control are needed. The desire to pull away from formation keeps getting stronger! But my fellow pilots are facing exactly the same conditions.

What a practice drill! I am like a spring, ready at any moment to snap open when I lose sight of the lead aircraft, break to the side and proceed to land individually.

My cockpit was practically tucked under Kakhanovskiy's stabilizer. All I could see was that stabilizer, and even it was half obscured in the "soup." Unbelievable tension. My hands seemed to be shaking, not from physical effort but from the endeavor to fly with greater precision. At this moment it was impossible to hold throttle and stick motionless.

As my element leader cut through the cloud mass, cloud roiled up aft of his stabilizer and streamed across my canopy, scattering cloud tendrils in all directions. When would we finally break out? His entire aircraft was now visible, but we were still in clouds. It seems that the sun-heated upper layer was very dense. The further we got from the sun, the better visibility became. In any case I stayed close behind him. Who knows what awaited us below? I felt better seeing my element leader's entire aircraft.

How thoroughly and conscientiously we had trained for this kind of flying! It had taken a great many training sorties in VFR weather before we acquired a sense of flying in formation!

Dark patches began flashing by below us. It was the ground! We broke out of the clouds. I could see the runway straight ahead, beyond the yellow eyes of the daylight runway-end floodlights. They were expecting us. It is nice when there is someone waiting for you, and you are aware of this fact. Those waiting for you are persons you need and without whom your life is inconceivable. That is our town down there. And it needs us. The skies must be kept peaceful. This is the essence of our flying profession.

Helicopter Gunship Offensive Tactics Against Air Target

90R10003M Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 24-25

[Article by Military Pilot 1st Class Col V. Smusenok, candidate of military sciences: "Helicopter Gunships Attack"]

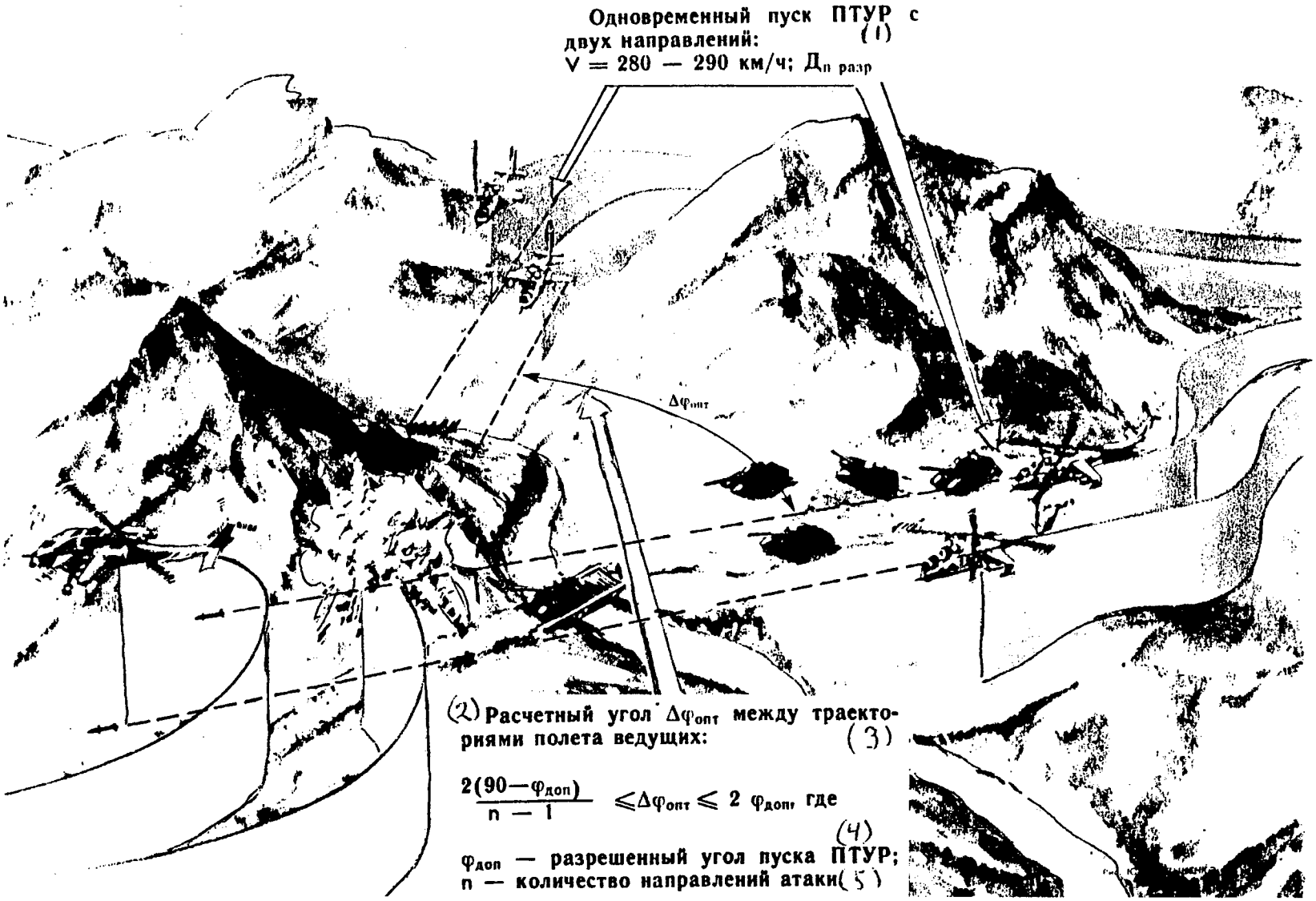
[Text] **Pincer Tactic**

This tactic can be employed by a four-ship section (two-ship element) of helicopters against enemy helicopters as well as against other low-flying airborne targets in situations where it is not possible to gain the element of offensive surprise.

Following target detection and identification, the helicopter section (element) shifts into a loose formation. The pilots accelerate to an airspeed close to maximum, and they proceed to close with the enemy on a pursuit curve from two directions intersecting at calculated angle (Delta Phi_{opt}). Each two-ship element (helicopter) takes aim independently, but they fire antitank guided missiles (ATGM) on command by the section (element) leader after reaching authorized launch range ($D_{p\ razr}$).

Key:
1. Simultaneous launch of ATGMs from two directions:
2. Calculated angle
3. between flight paths of element leaders:
4. authorized ATGM launching angle;
5. number of directions of attack.

АТАКУЮТ БОЕВЫЕ ВЕРТОЛЕТЫ



With a simultaneous attack from two directions, there is a high kill probability, even against a vigorously maneuvering target.

Problems With Experimental Reorganization of Aircraft Servicing, Maintenance

90R10003N Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 30-31

[Article, published under the heading "Innovations in Aircraft Maintenance," by Majs V. Sukovatyy and G. Shpakovskiy: "Why the Experiment Is 'Skidding'"]

[Text] The aircrew was not expecting such a miss: on a bombing range run they impacted 800 meters from the target. After returning to base they determined the reason for the poor performance. It seems that Senior Lieutenant Ignatov, who had prepared the aircraft for the mission, had failed properly to adjust the bombsight and navigation system, and this had resulted in failure to accomplish the mission.

Of course this officer had displayed negligence, by counting entirely on the first-shift people. But even if he had wanted to do it right, he would have been unable to do so. He was not properly qualified.

Throughout his career in the service Ignatov had worked as an aircraft equipment specialist. But now the subunit no longer has the traditional division into maintenance groups, nor is there a division into specialists in avionics, armament, etc. Nor is there an aviation engineer service as such. By decision of higher headquarters, in this squadron the pilots and navigators are separated from the technical personnel, who are organized into an aviation technical subunit with its own commanding officer—the former squadron engineer—and his deputy for political affairs.

They have also abandoned the division into aircraft technicians [crew chiefs], flight technical maintenance unit and maintenance group specialist personnel. Aircraft are prepared for flight operations by servicing teams headed by team leaders. Distribution of duties and responsibilities among engineer and technician personnel has also been changed considerably. Specialist personnel perform maintenance duties not on aircraft equipment or aircraft systems, but rather on the basis of maintenance routing. For example, only one person is now responsible for the instruments and assemblies preparation of which previously was handled by different groups.

In the collective with which officer G. Chernov serves, in the past as well they engaged in an intensive effort to find ways to improve the efficiency of flying labor and to improve the quality of servicing and maintenance of aircraft equipment. Suggestions and proposals, however, were maintained within the rigid framework of regulations and manuals. For example, adoption of the cross-parallel method and the two-shift method failed to produce the anticipated effect because they constituted a half-measure.

Today Air Force personnel have been given the opportunity to test in a practical way ideas which for many years were up in the clouds, as they say. To put it more precisely, this innovation has been long waiting for acceptance. Finally perestroyka made it possible actually to do something about it.

Not much time has passed since then. Perhaps it is a bit early to draw conclusions. It is obvious, however, that the new method is not working out entirely smoothly. Technically this could give its opponents cause to rejoice. Working in the new manner has degraded a number of performance figures, such as number of sortie-readied aircraft. And as is attested by the Ignatov incident, quality sometimes leaves much to be desired.

A question arises: were they not a bit hasty in radically reorganizing the aviation engineer service? Perhaps success should have been sought in another way—within the framework of the old but tried-and-tested method?

Different people give different replies, including those which are mutually-excluding. Pilots and navigators are in favor of the experiment, especially the flight commanders and higher.

Flying-duty command personnel have finally been enabled to work directly with training and indoctrination of combat pilots. They have been freed of "terrestrial" concerns, which in the past took up the lion's share of their time and energy.

Take subunit internal affairs, for example. As one-man commanders, in the final analysis flying-duty commanders and political workers were responsible for this, although they were unable thoroughly to examine the state of affairs. A pilot's daily schedule is extremely busy. Preparation for flight operations, practice drills, pre-mission rest, readiness testing.... If you omit something or do something at half effort, what we have here is not a minor mistake but a gross violation of flight safety requirements.

And also, one must know the psychology of aircraft maintenance personnel: they have respect for that commander with whom they work together, not one who shows up at the barracks from time to time to dress the men down.

The officer who in fact commands maintenance personnel has received full authority with the appearance of the aviation technical subunit. An end has been put to lip-service responsibility once and for all. Each individual is to do his own job.

Such a future is not, however, to the liking of all aviation engineer service personnel, although it would seem that they of all people would like it. On the one hand the

reorganization brought an end, to use their words, to "incompetent" pressure brought to bear on ground maintenance personnel by pilot-commanders. It is now no longer possible to apply the principle of "get moving" or "I don't care if it kills you, but get that aircraft ready." The servicing teams prepare the aircraft, and nobody knows what crew is going to fly a particular aircraft.

On the other hand the squadron engineer has become a one-man commander. His job duties have increased, but his pay and job category are the same as before.

These are not trivial matters. An officer, and particularly a command officer, should be given appropriate work incentive. Without this one cannot count on "innovative zeal." The new method seeks to focus on inquiry and initiative. But will it work if a person continues working for not more than mere thanks, as they say?

Let us be frank: working on the flight line and in the aircraft shelter requires first and foremost readiness and willingness to perform skilled, highly responsible labor, not labor by a novice but rather by an experienced maintenance specialist.

Is this not the answer to why a mistake was made by Senior Lieutenant Ignatov, in the incident mentioned above? He knows aircraft equipment like the back of his hand. He can service and maintain aircraft blindfolded. In his own field this officer is a highly-skilled professional.

But the not too well-conceived organization of the work process has left an imprint. What has happened is that the job duties which were previously performed by bombsight and navigation system specialists has been distributed among maintenance routings. And now Ignatov has to perform equipment inspection which requires knowledge and skills of a different kind. We are not talking about mastery of an aggregate of work techniques in a related area.

This officer mastered the work procedures, but he did not possess an understanding of the essence and substance of the physical phenomena involved, since this had never been required of him in the past. He had checked aircraft equipment primarily according to the procedure: "If it works, fine; if it doesn't work, replace the defective unit." Now he must also answer the question: why doesn't it work?

Ignatov is not the only one faced with difficult problems. Lt Col L. Komarovskiy and the other aviation engineer service ranking officers have no recipe for stepping up the performance of their technical personnel. But why not find ways to make more extensive use of material incentive? Unfortunately most of the technicians are "average" performers. This problem as well cannot be solved with a cavalry-charge approach. These people, true workers, know their worth. These maintenance personnel have been given a serious job to do: to ensure flight operations effectiveness and flight safety. Those same regulations forbid arbitrary application of pressure.

The advantage of the new method is the fact that each maintenance man is personally assigned to a maintenance routing. Thanks to this fact, junior aircraft maintenance specialists have appeared on the flight line. In the past, two or three years ago, the mechanic was a mythical figure. He would be the first one to be assigned to a menial work detail that had nothing to do with flight operations. An officer would uncomplainingly perform the mechanic's job duties. Now a mechanic is signed off for performance of maintenance procedures on his assigned routing. And nobody else is authorized to substitute for him. Junior aircraft maintenance specialists no longer function as errand boys on the flight line: "Fetch this, bring that, hand me that," but rather perform their own complete, specific task.

Other maintenance personnel are equally rigidly "programmed." But herein lies the Achilles' heel of the new method. Everybody is closely "interlinked." If anybody is absent, the crew is virtually incapable of releasing an aircraft.

Why is this? The servicing crews are not yet at full strength. Some warrant officer positions are vacant. The detachment commander has no housing available—the main thing that can be used to attract this category of personnel. And it frequently happens that, for example, only three aircraft are readied for flight operations instead of the designated four. This means that somebody will be unable to go up during this flight operations shift.

The following expression is quite appropriate here: "Shortcomings are a continuation of virtues." The new method provides better capability than the traditional scheme for distributing and allocating manpower and resources, as well as making the preparation of aircraft more efficient, but the adopted pace does not permit personnel to stop or slacken tempo. Proceeding along their work routing, maintenance personnel are able only to record the fact of a malfunction or irregularity in equipment or instrument operation.

A special logistic support service has been set up in the detachment. Capt N. Klichko handles issuing of units and assemblies in place of defective items. But sometimes there is nobody available to get these items back into proper working order. In the past the maintenance specialists of the appropriate group would handle this task. Now the detachment only has a specialization area engineer. If a problem occurs while he is on duty, it is quickly corrected, but if the engineer is not available on the flight line, virtually nobody will take care of the problem. Everybody is "bound" to his route, and the detachment commander and servicing team leaders have no free manpower. The malfunction may be a simple one, but the aircraft is grounded. This is perhaps the system's main weak point.

The men are aware of the problem, but opinions differ over ways to get out of this impasse situation. The suggestion was made to form a separate team which

would specifically work on correcting minor malfunctions, enlisting the services of the detachment engineers, reassigning to this team or taking maintenance personnel from the aircraft maintenance unit. This solution seems optimal.

Lt Col L. Komarovskiy is absolutely opposed to it: "It would be a 'Pyrrhic victory.' Of course we could immediately put an end to many problems, but it is no long-term solution. The route-assigned personnel will lose their ability to think. They will become transformed into spotters of malfunctions and will wait for an engineer or the 'mobile team' to come to their assistance. No, let them learn, including from their own mistakes."

This view is shared by other aviation engineer service supervisors, who are convinced that counting on broadening area of maintenance specialization leads to leveling of the men's knowledge and skills.

Are these perhaps difficulties of a transition period, when the main inhibiting factor—stereotypes of thinking—will prevail? Yes, to some extent. It is difficult for many to step beyond their former notion of the aviation engineer service. But it is not only this which is causing the experiment to "skid." Having given their approval for the experiment, those in positions of responsibility failed to think through the matter of providing support for the maintenance people. Of course we are not advocating the creation of hothouse conditions. We must not ignore reality, but if calculations differ so much from obtained results, one would think that corrections or adjustments should be made.

Of course one can pretend that nothing is happening, and one can continue to appeal to the men to mobilize their energies, to work hard, to find additional reserve potential. It is high time to realize, however, that today people cannot be made to perform great deeds by resorting to slogans alone. Maintenance personnel cannot cope with the problems on their own. These problems must be solved by working together.

Lessons of World War II Analyzed

90R10003O Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 34-35

[Article, published under the heading "50th Anniversary of the Event," by Maj V. Ovsyannikov, candidate of philosophical sciences: "World War II: Facts and Lessons"]

[Text] World War II began 50 years ago. It claimed more than 50 million lives and involved 61 countries. More than 110 million men were placed under arms. One finds in the foreign literature a great many different claims pertaining to the causes of this war and the responsibility of the parties involved. An American historian by the name of (Aldriks), in a book entitled "Reanalyzed Sources of World War II," recently published in the United States, fairly fully reflects a currently widespread view in the West that Germany and the USSR bear an equal share of responsibility for the outbreak of World War II.

We must state that the assertion made by this American scholar is far from the historical truth. What he does is juggle the facts, making use of the "after this, that is, as a conscquence of this" technique. The facts, however, are as follows: the date of the outbreak of war was scheduled by Fascist Germany's leaders as early as the spring of 1939. Attesting to this, in particular, is a captured authentic document—instructions issued by Armed Forces High Command Chief of Staff Keitel, dated 3 April 1939, which read as follows: "The Fuehrer has issued the following instructions regarding Operation Weiss (plan of attack against Poland—W.O.): preparations are to be carried out so as to ensure readiness to carry out the operation not later than 1 September 1939."

The signing of the nonaggression treaty on 23 August 1939 was a consequence of the ambiguous position taken by Great Britain and France, which were attempting to leave the Soviet Union facing Germany alone. The facts indicate that during the spring and summer the Western governments, using all sorts of pretexts, avoided making specific decisions on Soviet initiatives aimed at creating a collective security system. In July 1939 the Soviet Government proposed to Great Britain and France that they enter into a political pact and military convention aimed at blocking Hitlerite aggression.

The situation in Europe had already reached a maximum state of tension by this time. Only a few weeks remained before Germany's invasion of Poland, but the military missions of the Western countries were in no hurry, and did not reach Moscow until 11 August. In addition, it was ascertained at the first session that they were not authorized to sign a pact. According to its instructions, the British mission was to "endeavor to limit a military agreement to a formulation which was as general as possible" and to conduct negotiations "very slowly."

They did not play the game so skillfully that the Soviet Union was unable to figure it out right at the outset. In this difficult and dangerous situation Soviet leaders were faced with a dilemma: either to accept, for purposes of self-defense, the German Government's proposal to enter into a nonaggression pact, or to reject such a pact, thus helping along the Anglo-French plan to draw the USSR into war with Germany as quickly as possible.

The impasse which arose during the Soviet-British-French talks was not resolved, and on 23 August the USSR signed a nonaggression pact with Germany. The subsequent development of events and diplomatic correspondence, it is emphasized in the Theses prepared by the Commission of Scholars from the USSR and PPR on the History of Relations Between the Two Countries, provide grounds to conclude that at this time a formal agreement was reached, pertaining to the spheres of interests of the two countries—a guarantee of a line which German forces were not to cross, which was essential for the security of the USSR.

Unfortunately original documents confirming this agreement have not been found to date. The commission established by the USSR Congress of People's Deputies will present a competent conclusion on this matter.

At that same time, that is, at the end of July and beginning of August, Anglo-German talks were being held in London, at British initiative, under conditions of the greatest secrecy. The aim of these talks was to reach an agreement with Germany in the political, military, and economic domains. This is also today a well-known fact. It is indicative that on the very eve of the war British Prime Minister Chamberlain stated in a message to the German Chancellor that he was in favor of "making friendship the basis of relations between Germany and the British Empire." U.S. Cabinet Secretary Ickes made the following entry in his diary on 26 August 1939 in this connection: "I can hardly blame Russia for the pact. The only one responsible is Chamberlain."

The facts of history convince one that the sources of World War II lie in those profound contradictions and conflicts which existed between the imperialist powers and in their endeavor to put an end to the Soviet Union. For this reason one should not view the Soviet-German nonaggression pact in such a superficial manner as has been done in certain issues of LITERATURNAYA GAZETA. It was dictated by the harsh realities of the prewar years. This reality gives a first lesson in new thinking. Contemporary political thinking should give precedence to the interests of mankind as a whole over class interests, since survival in a world brimming with arms has become problem number one for all mankind.

In order to be consistent, it is necessary to understand one more lesson: the foreign-policy activities of a government and its diplomacy should be open and under the scrutiny of the country's democratically-elected supreme legislative body. This conclusion follows not only from the Munich Agreement (29 September 1938), which occupies a special place in the genesis of World War II, an agreement signed by Great Britain, France, Germany, and Italy, which essentially led to the liquidation of Czechoslovakia as an independent state and opened up the way for German aggression eastward. This lesson also proceeds from the 28 September 1939 treaty between the USSR and Germany.

This document, which formally defined the easternmost line of advance by the Wehrmacht in the form of a pledge made by Germany at the governmental level, was called not only a treaty of "boundaries" but also a treaty of "friendship." This gave reason to claim "friendly" relations between the USSR and fascist Germany even after the outbreak of World War II. As was stressed by Comrade M. S. Gorbachev, "we consider this to be not only a political mistake with serious consequences for us, for other countries, and for the Communist movement, but also an outright trampling of Leninist principles, causing a departure from Leninism." Signing of this document was possible only in conditions of Stalin's leadership, which was subject to no oversight or controls, and in conditions of political conformism and suppression of all dissident opinion.

The treaty of friendship with Germany also played a fateful role in determining the timetable of the attack on the USSR. It was known both in our country and abroad that Hitler harbored aggressive aspirations vis-a-vis the USSR. From 1940 Soviet State security agencies were receiving specific intelligence indicating that Germany and its allies were preparing for war. This information was passed on to our country's leaders. For example, one of the numerous messages to this effect, dated 12 June 1941, stated: "It is being claimed in top-level circles within Germany's air force ministry and at Luftwaffe headquarters that the question of a German attack on the Soviet Union has been definitively settled. It is not known whether the Soviet Union will be presented with any demands, and for this reason one must consider the possibility of a sneak attack." It states further that initial principal strike targets assigned to Germany's Luftwaffe were to be Murmansk, the Murmansk railroad, Wilno, Belostok, and Kishinev, and subsequently aircraft plants in Moscow, ports on the Baltic Sea, plus other targets.

That same day USSR state security officials reported to Stalin that fascist border violations were constantly occurring along the Soviet frontier. On 185 different occasions fascist aircraft violated Soviet airspace between October 1940 and 10 June 1941, with 91 intrusions occurring just in May and the first 10 days of June. Stalin was skeptical, however, toward these intelligence data and reports. Valuable information was rendered useless by the political situation.

The experience of World War II attests to the fact that Germany had been preparing for aggression against the countries of Western Europe and the USSR secretly, under cover of diplomatic and propaganda disinformation. The objective was to achieve the element of military strategic surprise, which gives enormous advantages over the defending party. In this connection particular attention in the years preceding the war was devoted to development of blitzkrieg theory, which constituted the foundation of the Wehrmacht's strategy. According to this theory, victory over the enemy should be achieved in the course of a single, swift-moving military campaign, by means of powerful surprise attacks by large forces of motorized troops and air forces. It is important to note that fascist Germany began all acts of aggression with massive airstrikes on airfields, command facilities, route communications centers, economic and administrative centers.

It is highly symptomatic that today in Western military-historical publications instances of Hitlerite "blitzkrieg" are presented as unsurpassed examples of tactical and strategic skill. The West German magazine STERN stated: "Admiration for the Wehrmacht's professionalism makes one forget about the crimes of Nazism." Nor is this mere happenstance. While the Warsaw Pact nations are implementing in a practical manner the defensive directional thrust of their military doctrine,

NATO military doctrine maintains its offensive character and continues to propose utilization of nuclear weapons as a means of threat, as well as the conduct of combat operations and achievement of victory in nuclear war. NATO Secretary General Woerner came right out and stated that under no conditions whatsoever does the NATO bloc acknowledge the possibility of freeing Europe of nuclear weapons. All U.S. militarist plans are based on the conduct of military operations on foreign soil and allow for preemptive strikes "on suspicion," as well as massed strikes to crush resistance "in the initial phase of a war." Such offensive air assets as Stealth aircraft and cruise missiles would also be tasked with this mission.

For a long period of time the difference in the doctrinal views of the Warsaw Pact and NATO also resulted in a difference in approaches to definition of potential for sneak attack, reduction of which would eliminate the threat of outbreak of war. In particular, only three categories were designated by NATO: tanks, artillery, and armored fighting vehicles, while excluding, in contrast to the Warsaw Pact, personnel, helicopters, and strike aircraft. In the opinion of military experts, however, the firepower of an artillery system is less than that of a helicopter gunship by a factor of from 5 to 7, while the ratio for a strike aircraft ranges between 10 and 12 to 1. As we know, NATO enjoys superiority precisely in rotary-wing and fixed-wing aircraft.

This NATO position was in perfect agreement with the NATO Follow-On Forces Attack concept—according to which the enemy should be hit to the entire depth of his combat dispositions. And quite recently the U.S. President, responding to an appeal by the Warsaw Pact member nations to the NATO countries to appreciate the new realities of today's world and to make use of the opportunity which is now being presented in order fully to overcome the consequences of the "cold war," proposed that the Allies extend the concept of reduction of conventional forces to tactical strike aircraft and land-based combat helicopters in a zone extending from the Atlantic to the Urals.

Consideration of the sad events of World War II convinces one of the need for decisive rejection of offensive doctrines and transition in organizational development of military forces from the principle of being armed far beyond the limits of reasonable sufficiency to the principle of reasonable sufficiency for defense.

Finally, there is one more lesson which provokes thought and conclusions. We are talking about competence of military leadership. This issue will unquestionably be treated in greater detail in the 10-volume "Istoriya Velikoy Otechestvennoy voyny sovetskogo naroda" [History of the Great Patriotic War of the Soviet People], which will soon be published. But at this point we can note the culpability of Stalin, who destroyed the flower of vanguard military thought, which advanced the ideas of creating strong mechanized combined units, perfecting air tactics, and providing military forces with new weapons and equipment. Many talented, innovative military commanders paid with their lives for their disagreement with the "cavalry charge" theory supported by Stalin. Incidentally, the Hitlerites fully appreciated their ideas and utilized them with some success.

In the course of these repressions, the Red Army lost more top-echelon command cadres than during all of World War II. The German-Fascist command authorities were delighted at the annihilation of military cadres in the USSR. The following is evidence of this. Receiving a report on 5 May 1941 from Colonel Krebs, who had temporarily replaced the German military attache to Moscow, Chief of the German General Staff Halder made the following entry in his diary: "The Russian officer corps... is much worse than in 1933. It will take Russia 20 years for its officer corps to regain its former level." Incompetence in direction of combat operations as a consequence of the Stalin cult unquestionably was one of the reasons why Soviet military casualties in World War II, according to foreign sources, exceeded British losses by a factor of 40, and exceeded American losses by a factor of almost 70. Let this testimony be warning to those who, under the banner of a "campaign for peace," expatiate about further, unreasonable reduction of the Armed Forces and about the territorial-militia principle of Armed Forces organization, while understanding nothing whatsoever about military affairs. As was stated at the USSR Congress of People's Deputies, "we are unable to dispense with an army and to scrap our arms" by virtue of objective external conditions. This means that strengthening cadre personnel in the military is a task of particular importance.

In the conditions of the present reduction of the Army and Air Force, everything possible is being done in order not to lose trained personnel of initiative: officers, pilots, and other specialist personnel, particularly those with combat experience. Not purely questionnaire or statistical data should serve as a criterion for promotion to command positions, but rather military abilities, intellectual breadth, firm volition, and flexible thinking, which enable one to make the unconventional decisions for which the great Soviet military commanders of World War II were famed.

While giving due credit to the great military commanders, nevertheless one should emphasize that the principal, true victor was the people, welded together by friendship among all our country's nationalities and ethnic groups. This applies today as well.

Hegel made a well-known statement: the sole lesson of history is that history teaches nothing. There is reason to hope that the new political thinking will prove this aphorism wrong. The lessons of World War II cannot be forgotten, for the sake of the life of future generations.

Su-27 Flanker Fighter Praised

90R10003P Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 9, Sep 89 (signed to press 7 Aug 89) pp 36-37

[Article, published under the heading "Soviet Defense Potential: Qualitative Parameters," by Lt Col V. Dolgishev: "Su-27: Vertical Climb"]

[Text] The 38th International Air Show, Aeronautics and Space Exhibit at Le Bourget, France, which ended in June 1989, included the participation of approximately 1,600 companies and design organizations from 34 different countries. More than 200 airplanes and helicopters were exhibited, as well as hundreds of rockets, aircraft and space hardware, and airfield equipment, which reflected the principal advances in world aerospace science and technology as well as development trends.

The Soviet exhibit was the most impressive. Our country displayed the unique giant An-225 Mriya [Fantasy], which had flown the Buran space shuttle piggyback to Le Bourget, the new Tu-204 and Il-96-300 passenger aircraft, the Mi-17 "flying hospital" helicopter, and the latest lightplane, the Su-26M.

Experts and exhibit visitors showed particular interest in operational combat aircraft: the Su-25 ground-attack aircraft, the Mi-28 helicopter and, of course, the most advanced fighters, in service with the Air Force and Air Defense Forces; the Mi-29 tactical fighter, and the highly-maneuverable Su-27 fighter-interceptor. It is acknowledged in the foreign press that these aircraft are clearly superior in performance to counterpart foreign aircraft and are today acknowledged to be the world's finest aircraft. Even the crash of the MiG-29 (the French panel which investigated the accident, with the participation of Soviet experts, concluded that starboard-engine compressor stall had been caused by ingestion of a bird into the jet intake—which can happen to anybody) could not diminish it in the eyes of the experts. Incidentally, this incident demonstrated the reliability of the K-36 ejection seat designed by G. Severin, with which Soviet combat aircraft are equipped.

Nevertheless the greatest success in the skies over France fell to the lot of the Su-27 fighter-interceptor, designed by the Experimental Design Office imeni P. U. Sukhoy. To the general surprise of Western specialists in analysis of Soviet aircraft, in August 1985 Soviet television ran a film about the Sukhoy Experimental Design Office, in which an early version of the Su-27 was shown. Subsequently this aircraft was assigned the designation Flanker in the West, which means "covering the flanks." These short video clips, showing an experimental model of this aircraft on takeoff and during flight, were the first available information on the new Soviet fighter-interceptor.

"The bad news for NATO," the magazine INTERAVIA stated the year it first appeared at military airfields, "is that the Su-27 aircraft, code-named Flanker, is potentially the world's most capable fighter. This is not surprising, since the Flanker is just now becoming operational, 10 years after the appearance of the most comparable Western aircraft, the F-15 Eagle. This new aircraft by the Sukhoy Design Office is a remarkable machine...."

The Pentagon placed high hopes on the F-15, which has a top speed of close to Mach 2.5, is highly maneuverable, and has a low wing loading, not only as a tactical fighter but also as a space weapon platform. Equipped with the new APG pulsed Doppler radar and Sparrow missiles, it was state-of-the-art. The F-15 held a number of prestigious world records, holding an honored place in the official list of records recognized by the International Aviation Federation (FAI). The new Soviet Su-27 fighter-interceptor has rewritten the record book.

As we know, rate of climb is one of the most important performance characteristics in aviation, giving a general picture of its level of development. In the 1930's, for example, a pilot took approximately 10 minutes to climb to an altitude of 5,000 meters. This time was cut in half during World War II. The first jet fighters made it possible to advance further: an aircraft could climb to an altitude of 10,000 meters in 5 minutes....

For some time the time-to-height world records belonged to U.S. pilots. In 1958 time-to-height records were set with an F-104 aircraft. Four years later they were surpassed by an F-4 Phantom fighter. An F-15 set a new record in February 1975. This record lasted more than 10 years. Why were Soviet pilots in the "shadows" during all these years?

"We had the capability to rewrite the record book at an earlier date," the project manager stated, and added: "And the P-42 was not even specifically built to break records. Quite frankly, however, frequently in the press of our busy work schedule we unfortunately pay little attention to the prestige or purely competitive aspects of our work...."

Incidentally, an aircraft which was close to being retired was selected for the record-breaking flights. Appropriate modifications were made, and thrust augmentation was added.

The P-42, which was close in performance characteristics to the Su-27, broke several records in one of the most prestigious aviation performance categories: time to height, and altitude maintained in level flight. It took five world records in this category away from the F-15 Eagle. Our fighter-interceptor climbs to an altitude of 15,000 meters almost 7 seconds faster.

Let us get to know the recordholder better. The "Blue Streaks" (these twin-engined, twin-tailed monoplane aircraft are called this because of their light-blue camouflage scheme and great speed) are capable of finding, intercepting, and destroying within minutes a target out there in the boundless heavens. An elegant droop-nose

silhouette is capped by twin tail fins, flanked by stabilizers of generous size, operating as an all-flying tail. The fire-belching afterburner nozzles, like cannon barrels, literally shoot the interceptor skyward during departure climbout.

It is difficult to convey the full flight dynamics of the Su-27. What the Soviet pilots did with it at Le Bourget does not fit within the definition of elementary, advanced, or expert-level aerobatic maneuvers. It was a step into a new aviation era, demonstration of the fighter's ultramaneuverability.

The maneuver sequence went approximately as follows: immediately after takeoff the pilot flew two Immelmans ending with a half roll, a half roll and split S stopping at vertical, acceleration and entry into a loop with a 90 and 270 degree turn. After completing a double roll the aircraft transitioned into a 360 degree banked turn at maximum bank angle (time to complete turn: 13-14 seconds), followed by a sustained tight climbing turn, followed by a half roll. Then came a tail slide, followed by a wingover. This was followed by a pass at minimum controllable airspeed, and then, the sensation of the air show—execution of a "dynamic braking" maneuver, called the "Pugachev cobra" in honor of the first pilot to do it. There is not a single foreign fighter which can execute this maneuver.

...The aircraft passes above the runway in level flight, accelerating rapidly. It appears to be about to initiate a steep climb. The nose pitches up vertically, and then, to the amazement of the spectators, the aircraft does not climb out but, almost lying on its back (at a 120 degree angle of attack), continues in level flight... tail first. Airspeed instantly drops to 150 km/h. Another second passes, and the fighter abruptly pitches its nose forward, like an angry cobra. All that remains for the pilot to do is squeeze the firing button, firing his cannon or launching missiles; the entire forward upper hemisphere is in his field of fire.

"This move," explained design office official K. Marbashev, "can also be used when attacking a threat from a disadvantageous position. Let us say, for example, that it has passed over the interceptor on a forward-quarter approach and is several kilometers higher. The pilot instantly executes a "Cobra" tail stand and fires missiles over his shoulder, as it were.

A record-setting rate of climb and ultramaneuverability are the main but not sole superior performance features of the Su-27. This aircraft has a considerably greater combat radius and is capable of flying beyond Mach 2. These performance capabilities are determined first and foremost by the aircraft's outstanding thrust-to-weight ratio, which substantially surpasses that of the F-15.

The fighter-interceptor is powered by two AL-31 F engines, built by the scientific-production association whose present reputation is inseparable from the name of designer and academician A. Lyulka. We should note that this is the first turbofan engine designed by this engine builder.

"The engines for the Su-27, as for previous aircraft designed by this experimental design office," the association's chief design engineer explains, "were engineered following the traditions of Arkhip Mikhaylovich: Critical operating temperatures; maximum possible compressor pressure ratio; extremely high turbine rpm. All parameters are close to maximum. The engine is small in size, however, reducing aircraft weight by two tons. The engine is rated at high time between overhauls, and repair and maintenance operations are easy and convenient, which is important from the maintenance standpoint. Aircraft downtime is minimal; factory-trained technicians repair the turbines right in the field."

The new engine is of modular design. Put in simpler terms, it consists of separate units. If damage has occurred which cannot be corrected by local repairs, it is not necessary to disassemble the engine. All one needs to do is replace the problem module. And this is done right in field conditions, on the airbase flight line. Replacement of compressor blades as well as many other maintenance operations have become a routine, customary procedure in line units. Experience in replacing modules is also gradually being amassed.

In order that the reader, especially those who are unacquainted with modern aircraft technologies, not get the impression that the engine design is "too" simple, here are some facts about the turbine blades. The blade is made of a heat-resistant alloy and weighs approximately 90 grams. In a high-spooling engine the blade withstands a centrifugal force of 10 tons and does not lose strength from being bathed in the superhot gases, which exceed by more than 100 degrees Celsius the melting point of the metal of which the blade is made. How is this achieved? With an ingenious internal cooling system—something similar to human capillaries.

Development of the AL-31 F engine is continuing (the designers call it a base model, since they see considerable possibilities for further development). The scientific-production association has developed an extensive network of contacts and production relationships, which include Air Force units and manufacturing facilities, as well as more than 150 academic and industrial branch institutes. This not only provides the engine designers with new ideas, suggestions, and improvements, but also enables them to get a clear picture of future technology.

Here is an opinion about the new counterair fighter by those who fly it.

"A high-class machine is always beautiful," states Military Pilot-Expert Marksman Col Sulanbek Oskanov, master of sport in expert-level advanced aerobatic maneuvers on a jet aircraft, "and is easy to fly. Even with its outstanding combat characteristics, the Su-27 is easy to fly. Many of our pilots have transitioned into it

without waiting for the two-seater trainer version. They boned up on theory, and went right up...."

The aircraft's plus features include a quadruple-redundancy fly-by-wire control system, 10 external stores stations, excellent cockpit visibility, and an amazingly soft landing, due to a well-designed wing, which provides a ground cushion.

"It is a joy to fly the Su-27," Air Force squadron deputy commander for political affairs Maj Yuriy Vinyar shares his impressions. "I even find that it is easier to take G forces in this aircraft than in others."

"In air-to-air combat," commented Lt Col Yevgeniy Mashkin, "one can devote greater attention to tactics. If you involuntarily exceed the performance envelope during maneuvering, the Su-27 will come to the rescue and correct the error. The aircraft's performance envelope limiter is the pilot's friend and ally."

Pilots also appreciate the aircraft's great range and endurance. In this regard the Su-27 is superior to all Soviet and foreign counterpart aircraft. Need one stress how important it is for a counterair fighter to have the capability to remain aloft for an extended period of time?

The high thrust-to-weight ratio of the Su-27 counterair fighter, powered by AL-31 F engines, the use of new aluminum and titanium alloys, steels and composite materials, welded primary load-carrying members, as well as a number of important aerodynamic innovations suggest that the Su-27's engineered-in capability has not yet been fully exploited, that the fighter's potential is far from exhausted.

Changes have been made in the official FAI records. But this is not the ultimate goal of aircraft designers and builders. Nevertheless....

"I can boldly state," commented M. Simonov, chief aircraft designer at the Experimental Design Office imeni P. O. Sukhoy, "that every professional feels inner discomfort, if I may use this term, at seeing in the record book records held by one's competitors. But this is not the main thing. The point is that records reflect a level of technology attained at a certain stage. Particularly such prestigious records as time-to-height. In some sense this is a test of performance mettle. It is also a specific criterion of the quality of our product. Records offer unique food for thought not only for airframe designers but also for engine designers and other of our associates, for that which today represents almost maximum operating conditions will tomorrow become routine."

Demonstration of the Su-27 at the Paris Air Show is of course a far from ordinary event. In the past it would have been hard to conceive that the latest, newest Soviet combat aircraft would be shown to the general public. This is a result of the Soviet Union's new policy in the international arena and evidence of the defensive thrust of Soviet military doctrine. Unclassified and accurate data on the latest military hardware of the opposing sides are particularly essential in the new conditions. Nor do we hide the fact that, concerning ourselves with the reasonable sufficiency of our defense, we place main emphasis on qualitative parameters of improving its technical foundation. The new world records produced by the Soviet Su-27 counterair fighter constitute vivid confirmation of this.

UN Arms and Disarmament Monitoring Proposed

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[Article, published under the heading "International Cooperation," by Doctor of Technical Sciences G. Chernyavskiy and Candidate of Technical Sciences V. Grachev: "Arms and Disarmament Monitoring and Verification"]

[Text] Problems of ending the arms race and moving toward general and complete disarmament are important elements in achieving the goals and implementing the tasks of Soviet foreign policy. Addressing the UN General Assembly third special session on disarmament (1988), the USSR Minister of Foreign Affairs proposed, in amplification of the idea presented by M. S. Gorbachev in an article entitled "Reality and Guarantees of a Safe World" (PRAVDA, 17 September 1987), to establish an international monitoring agency under United Nations aegis, which would handle coordination and, if necessary, also verification of compliance with obligations based on arms limitation and reduction agreements and treaties, verification of compliance with agreements to reduce international tension, and monitoring of the military situation in conflict areas.

A mechanism of extensive international monitoring under UN aegis will in fact make it possible effectively to handle matters pertaining to regular collection of information and presentation of information to the United Nations, to possess an objective picture of events taking place, to detect preparations for military operations in a prompt and timely manner, to make sneak attacks more difficult to accomplish, and to take measures to avert, to prevent the spread and aggravation of military conflicts.

A central item in implementation of this draft proposal involves means of monitoring and verification: should the UN establish its own means or should it use national means? We feel that means of monitoring and verification should remain national, with these means also used to perform tasks mandated by the UN Program. There are several reasons for this. In the first place it is hardly likely that an international monitoring and verification system would be superior to national systems. Secondly, national monitoring and verification systems will exist independently of an international system, since they constitute a guarantee of national security. Third, total gathering of information of a military nature, if such information leaked from the UN, could cause harm to a

given nation in matters not falling within the area of monitoring and verification.

Finally, multiple duplication is also unwarranted from an economic standpoint. It is another thing altogether if it is a matter of verifying or checking detected violations of agreements and treaties based on reports by one or several countries. In this case availability of highly-effective UN means of on-site inspection is extremely essential. Utilization of such means would be of a sporadic nature; only limited such means would be required, and consequently the expenditures involved could be entirely acceptable.

Thus it would seem expedient to utilize both all available national technical means of verification possessed by the nations of the world community (ground, sea, air, and space-based means) as well as inspection capabilities specifically possessed by the United Nations in order to accomplish international monitoring of arms and disarmament.

The UN Secretariat's department for disarmament could direct an international monitoring system. Security centers are the main element of national monitoring systems. These centers should maintain continuous communications both with the United Nations data collection and processing center as well as with one another, which will help promptly resolve possible conflicts.

First steps toward establishing such centers were taken in the USSR and the United States in 1987 after signing the INF Treaty. National security centers will make it possible to collect information from ground, sea, air, and space-based national technical means of monitoring and verification, as well as perform storage, processing, and prompt transmission of such information to the United Nations in the required form.

Ground-based technical means should encompass the entire existing arsenal, including radar, seismic, meteorological, and radiation monitoring, astronomical and other kinds of assets.

Sea-based monitoring means are presently deployed aboard surface ships, submarines, on platforms and buoys.

Airborne technical monitoring means include devices carried aboard land-based and naval aircraft, as well as carried by airships and balloons.

All the technical means enumerated above are available, varying in types and quantity, to practically all nations in the world community and can be used for international monitoring of arms and disarmament. At the same time the capabilities of these assets are limited to a significant degree by the conditions of their deployment and operating area.

Extraterritoriality, total coverage area, all-weather capability, 24-hour surveillance, a high degree of promptness in information acquisition, continuous monitoring capability, the presently-attained degree of technical sophistication of onboard equipment, as well as other features suggest that satellite-borne devices will be able to make the most valuable contribution toward solving the problems of monitoring arms and disarmament. Utilization of satellite monitoring systems is already specified in the SALT I and SALT II treaties and from a legal standpoint does not constitute a violation of international law, including space law.

In addition, since 1978 France, Canada, and a number of other countries have been proposing the establishment of a UN satellite monitoring agency.

Analysis of monitoring tasks indicates that satellite assets should be able simultaneously to perform surveillance over large areas (greater than 1,000 square kilometers) and to detect small objects with a high resolution (0.15-0.3m). Toward this end a country's entire fleet of satellite assets providing capability to accomplish monitoring tasks to one degree or another should be enlisted for the purpose of obtaining information. These satellites should carry equipment for taking highly-detailed photographs, for optoelectronic imaging in the visible region of the spectrum and in the infrared band, as well as other devices.

At the same time analysis of information available abroad suggests that sattellite assets presently being utilized do not yet possess the capability to provide monitoring and verification as applicable to a number of agreements: for example, to monitor and verify facts of manufacture, stockpiling, and use of radioactive, chemical, toxic, and bacteriological agents, utilization of means of affecting the environment, and deployment of nuclear weapons and other weapons of mass destruction on the seabed.

In addition, one should also consider a process which unfortunately is still continuing in the world, a process of qualitative improvement of weapons of mass destruction and conventional arms in the direction of development of fundamentally new weapons based on the latest scientific and technological discoveries. SDI research conducted in the United States, for example, has brought a realistic possibility of development in the near future of such devices as laser weapons and kinetic kill vehichle.

The possibility of development of such "exotic" devices as nonexplosive radiological weapons based on radioactive materials, biological weapons based on utilization of charged or neutral particles, acoustic and electromagnetic emissions, geophysical weapons, and weapons affecting the environment and climate is being given fairly serious consideration.

All these factors demand improvement and development of national satellite-borne surveillance assets at the present stage.

UN technical means of inspection should ensure highly-effective on-site monitoring and verification, including

the earth's landmasses, oceans, air and space. They should include appropriate equipment for furnishing to UN on-site inspection teams. This equipment should provide capability both for contact and noncontact inspection methods.

On this basis, monitoring of arms and disarmament within the framework of broad international cooperation could become reality in the near future.

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